MotionWorks Enterprise

2.0

Configuration Guide

ZEBRA

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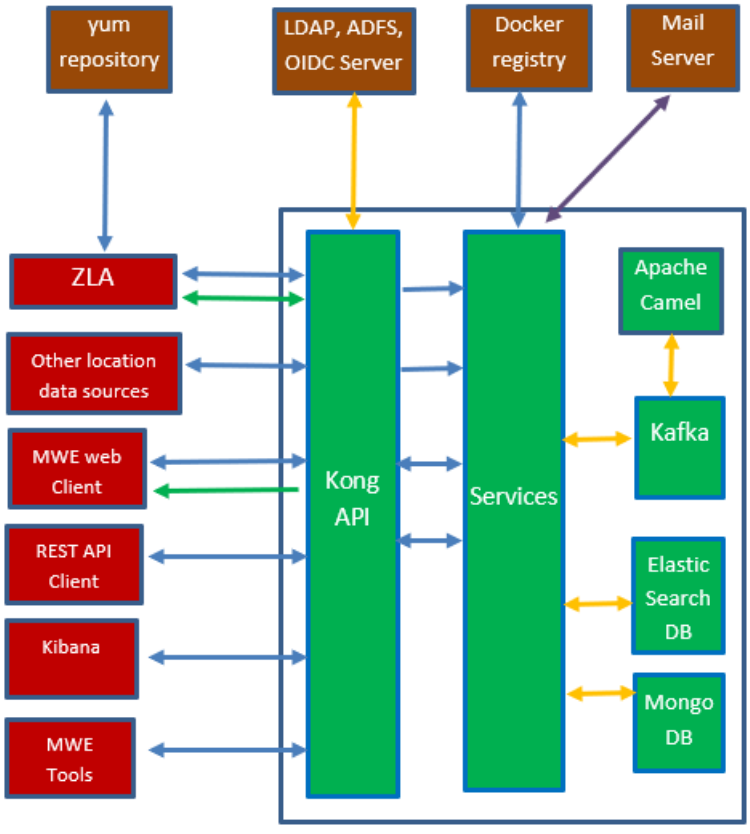
MWE Configuration Guide

This document provides instructions for configuring the MotionWorks Enterprise (MWE) 2.0.n software from Zebra Technologies Corporation after it has been installed. The 'n' in the version number indicates the latest 2.0 release. For installation instructions and server requirements, please see the separate document MWE 2.0 Installation Guide.

When configuring MWE, it is helpful to understand its basic architecture and the relations between its software modules. The simplified diagram below illustrates the main MWE software components hosted by the MWE server and some of the external clients and consumers.



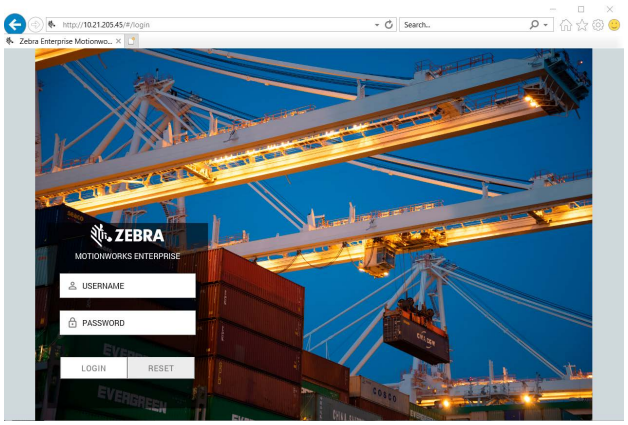
MWE Linux Server

An MWE deployment may or may not require a ZLA, which is a CentOS appliance that captures data from different types of sensors, puts the data in a standard format, and forwards it to the MWE server. For example, MWE 2.0 supports deployment of passive RFID readers without a ZLA, sending data directly to the MWE server. Also, you could have a location sensor or third-party application feeding data to MWE via the MWE API. However, most type of sensors supported by MWE 2.0 do require a ZLA.

Please note that the screenshots and figures included in this document may vary slightly from the MWE 2.0.n version that you have installed, where n identifies different version or releases of the MWE 2.0 release.

Launching the Web Client

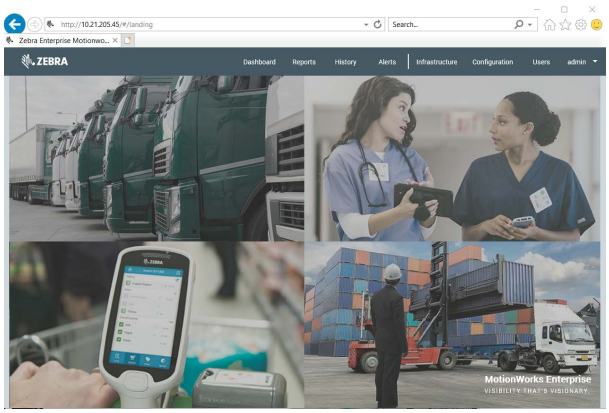
Once MWE has been installed, most configuration tasks can be done using the MWE web client, along with the System Builder discussed later in this document. To launch the client, open a web browser (Chrome, Firefox, Edge, ….) on a client machine or server on the network, and point it to http://MWE_Server_Name, where MWE_Server_Name is the MWE Linux server name or IP address. The login page will be displayed:



Default login credentials are Username = **admin** and Password = **admin**.

See Changing the Administrator Password on page 7 for information regarding how to change the default password.

Observe the landing page and the main menu bar at the top of the page. The menu items are: Dashboard, Reports, History, Alerts, Infrastructure, Configuration, Users, admin (the name of the account currently logged in).



The default admin / admin account has access to all items in the main menu bar.

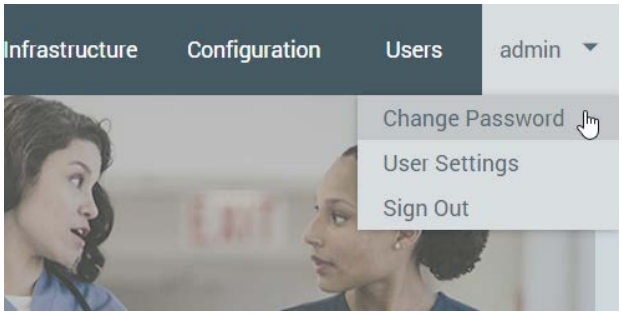
The following sections describe a sequence of typical steps in configuring the MWE software.

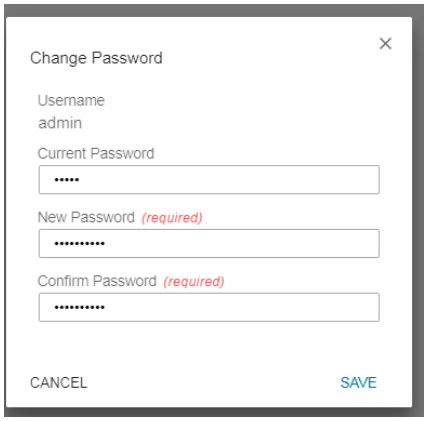
Changing the Administrator Password

MWE includes a default administrator account with access to all menu items, pages and functionality available in the web client:

- Username:**admin**
- Password:**admin**

To change the admin password, login using the admin account and select **Change Password** from the **admin** tab:





Enter the current password and the new password, and click **Save.**

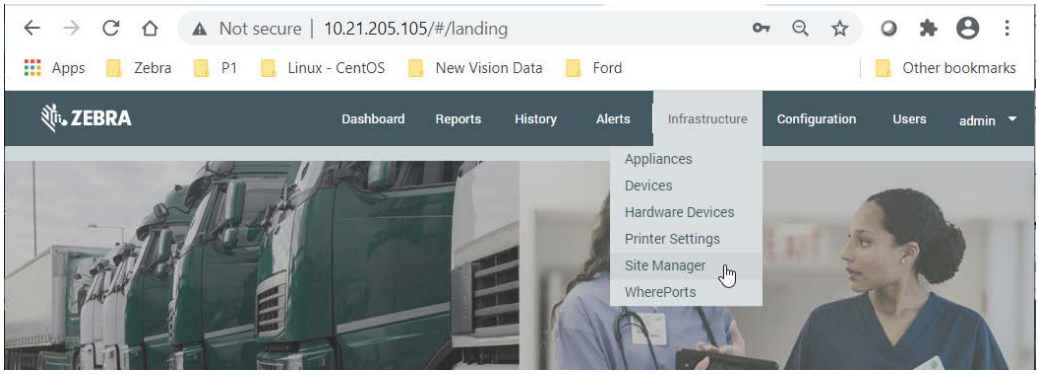
Sign out by selecting **admin** > **Sign Out** from the main menu bar.

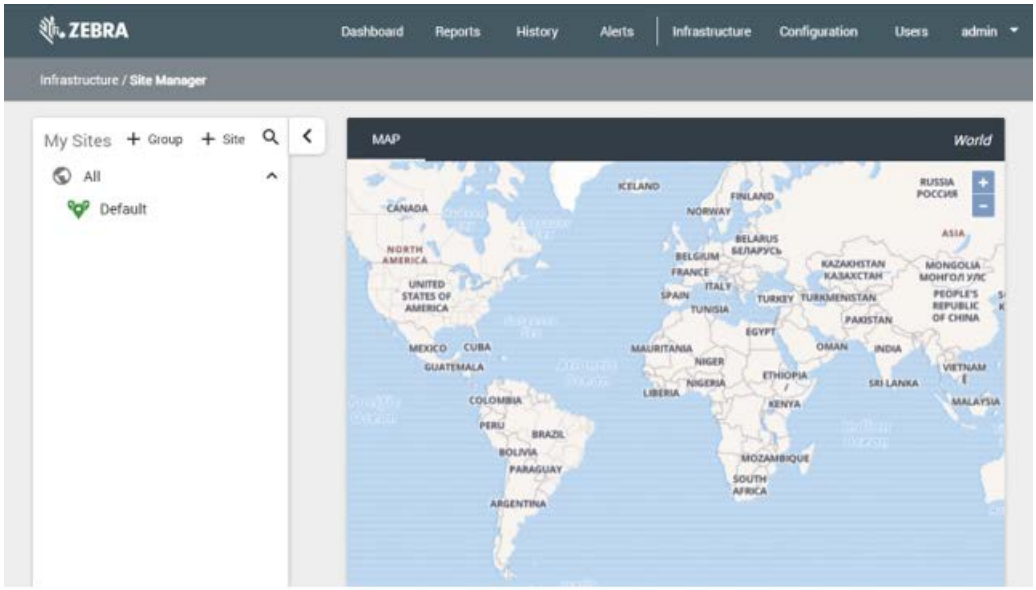
Adding site groups, sites, and site maps

One of the core functionalities of MWE is processing and displaying asset location data from multiple sites across a city, country, or the world. This section explains how to add sites, site groups, and site maps to the system.

Adding Site Groups

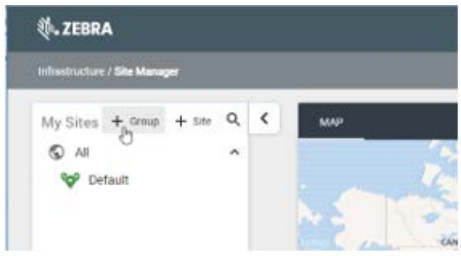
Open the **`Infrastructure > Site Manager`** page:



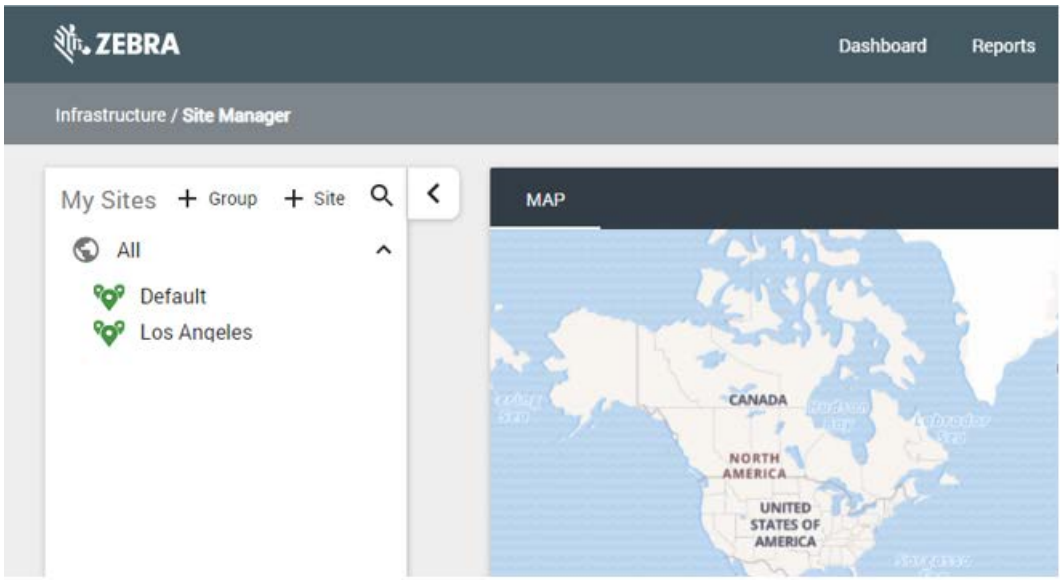


If you are using the default installation world map (refer to the MWE 2.0 Installation Guide) observe a world map with few country names in the Site Manager window. The map in the figure above corresponds to a more detailed map (north-america_us.mbtiles) installed at installation time.

For example, if your company has two sites in the city of Los Angeles, namely, a North LA site and a South LA site, and you would like to group them under a group named Los Angeles. To add a site group, click the **+ Group** link:

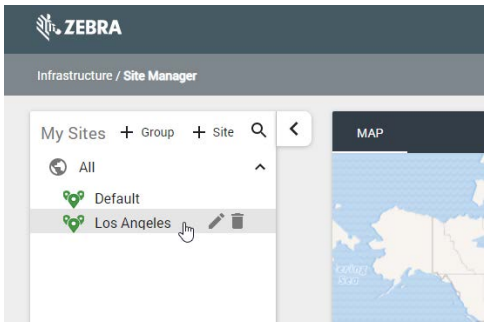


Enter the **Site Group Name** (Los Angeles) and click **Save**. The Site Manager tree-view pane will now show the newly added site group name (Los Angeles):



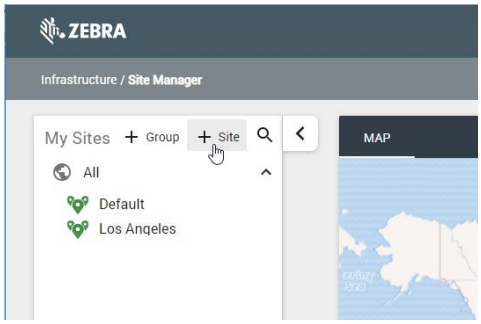
Create additional site groups as needed.

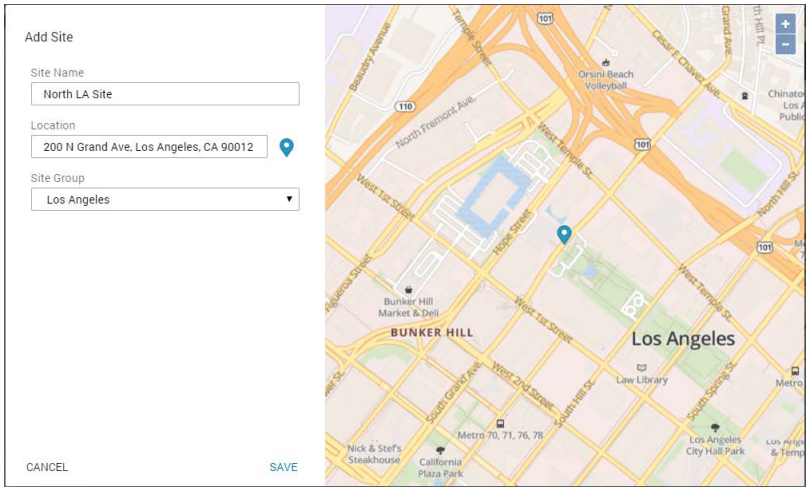
To edit or delete a site group, hover over the site group name or next to it. Two icons become visible; a pencil icon and a trash can icon. Click the pencil icon to edit the site group name and click the trash can icon to delete the site group.



Adding Sites

Add the North LA Site and South LA Site sites under the Los Angeles group, and click the **+ Site** link to add a site.



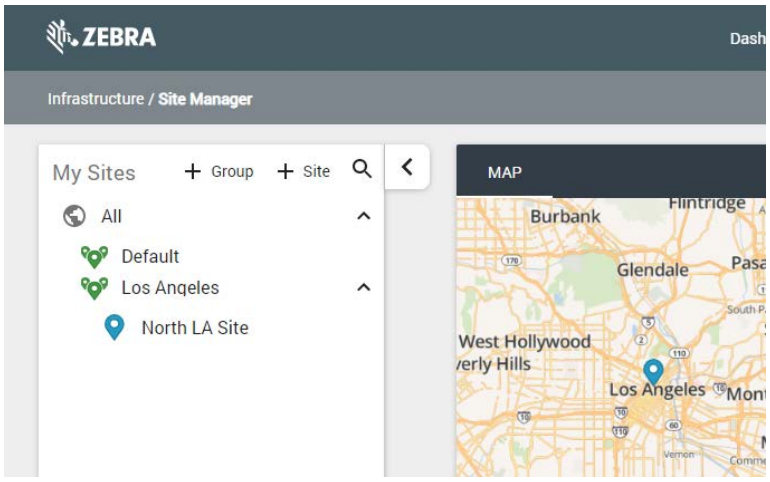


Fill in the following fields:

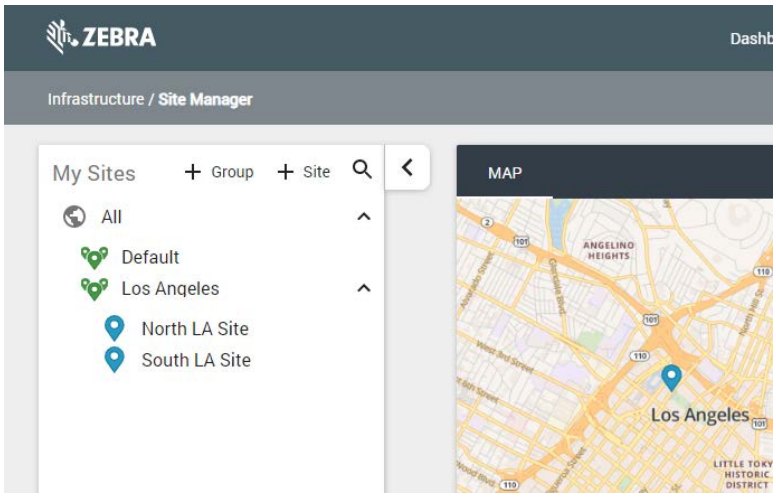
Site Name	Type in the desired site name
Location	You can zoom and pan the map and then drag the blue pin to the correct address. Or you can simply type the address and press the Enter key; the map will pan and zoom and the pin will be placed in the correct location automatically.
Site Group	Click the down arrow and select the desired site group, in this case Los Angeles.

NOTE: You will see a detailed street map, as show in the figure above, only if you have installed a detailed map such as north-america_us.mbtiles at installation time. You will see no map in the above window if you are working with the MWE default world map. Other than seeing no map in the above window, using the default installation map does not affect MWE functionality.

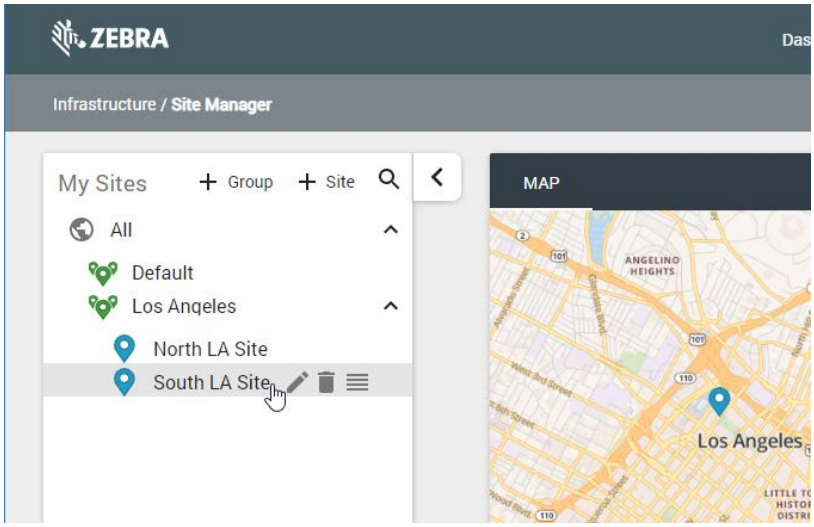
Click the **Save** button and observe the North LA Site listed under the Los Angeles group:



Similarly, for the South LA Site:



To edit or delete a site, hover over the site name or next to it. Two icons become visible, namely, a pencil icon and a trash can icon. Click the pencil icon to edit the site, and click the trash can icon to delete the site.

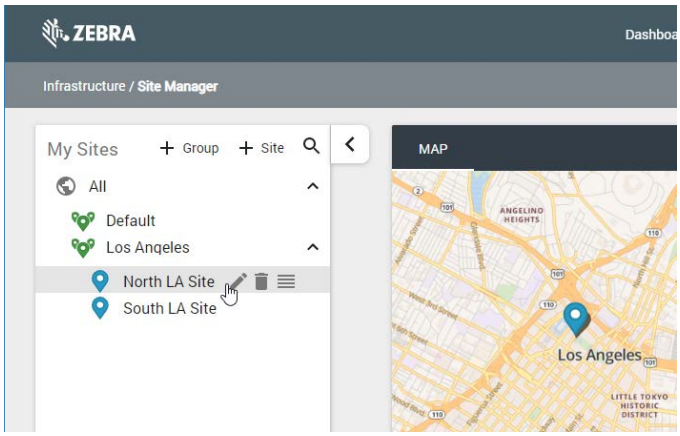


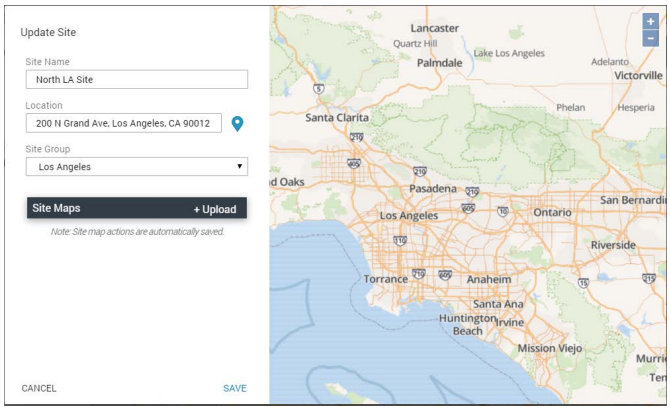
The third icon, a set of parallel horizontal lines, allows a site to be dragged to a different Site Group.

Adding Maps

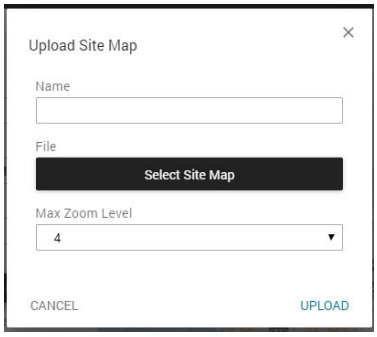
One or multiple maps can be added under each site. Assets whose location is being tracked will be shown on these maps. If you have a multistory building at a site, you may want to add a map per floor. If you have a campus with several buildings and parking lots and you would like to add a map for each of them.

To add a map under a site, hover over the site name or next to it, and observe the Edit icon (pencil icon) next to it. Click the **`Edit`** icon. In the example below, we click on the **`Edit`** icon next to the North LA Site:





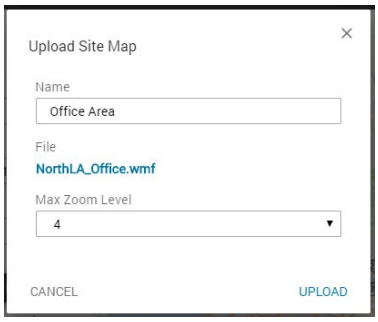
Click the **`+ Upload`** link:



Provide the following information:

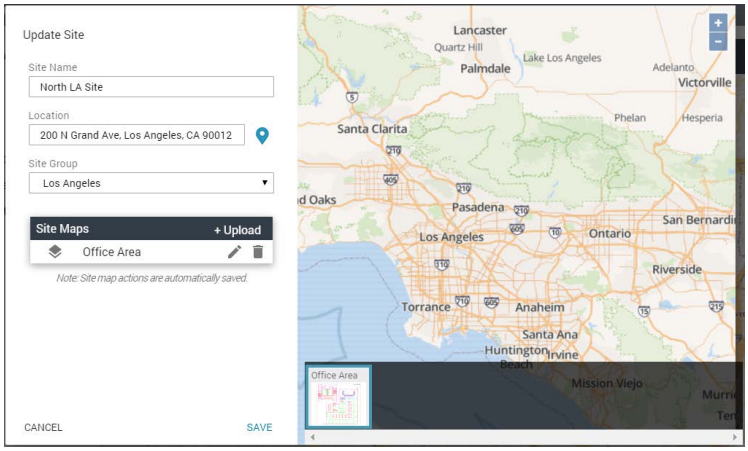
Name:	Enter any map name you deem appropriate
File:	Click the Select Site Map button and browse to the location on your local computer where the map file you want to upload resides. In MWE 2.0, only windows metafiles (.wmf) are supported.
Max Zoom Level:	This defines how many times you will be able to zoom in when displaying the map in the web client. The default value is 4 and the maximum available value is 8. For large files, a lower zoom level will result in a smaller upload time.

Once you have selected a map file (.wmf), the map file name will be displayed:

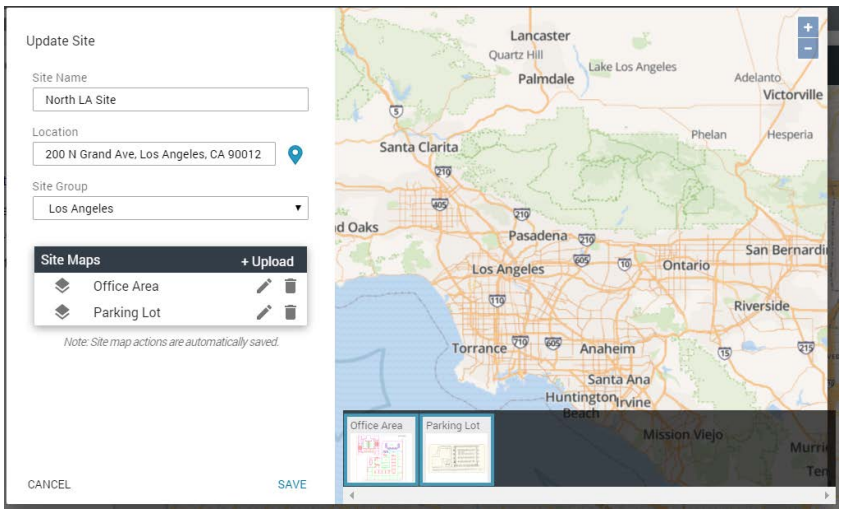


Click the **`Upload`** button. The upload process may take from a few seconds to many minutes, depending on the map size and Max Zoom Level selected. The reason is that the map is both being uploaded and tiled for later use. Tiling is done only once when uploading a map into the system. Once the upload and tiling process is completed, you will be returned to the site properties window.

The uploaded map name will be listed under **`Site Maps`**, and the map image will be displayed in the lower section of the window, as shown in the figure below:

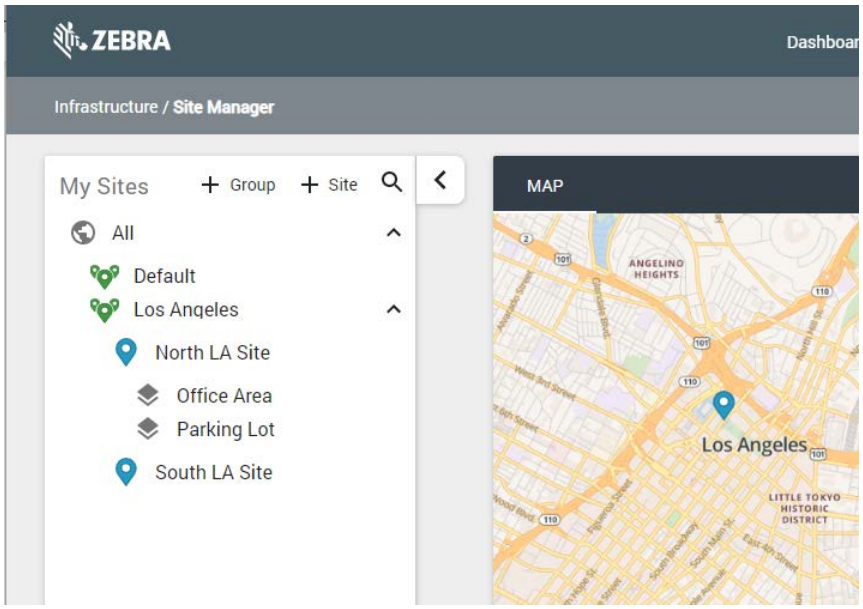


You can add more maps. After adding a second map named Parking Lot, you will see:

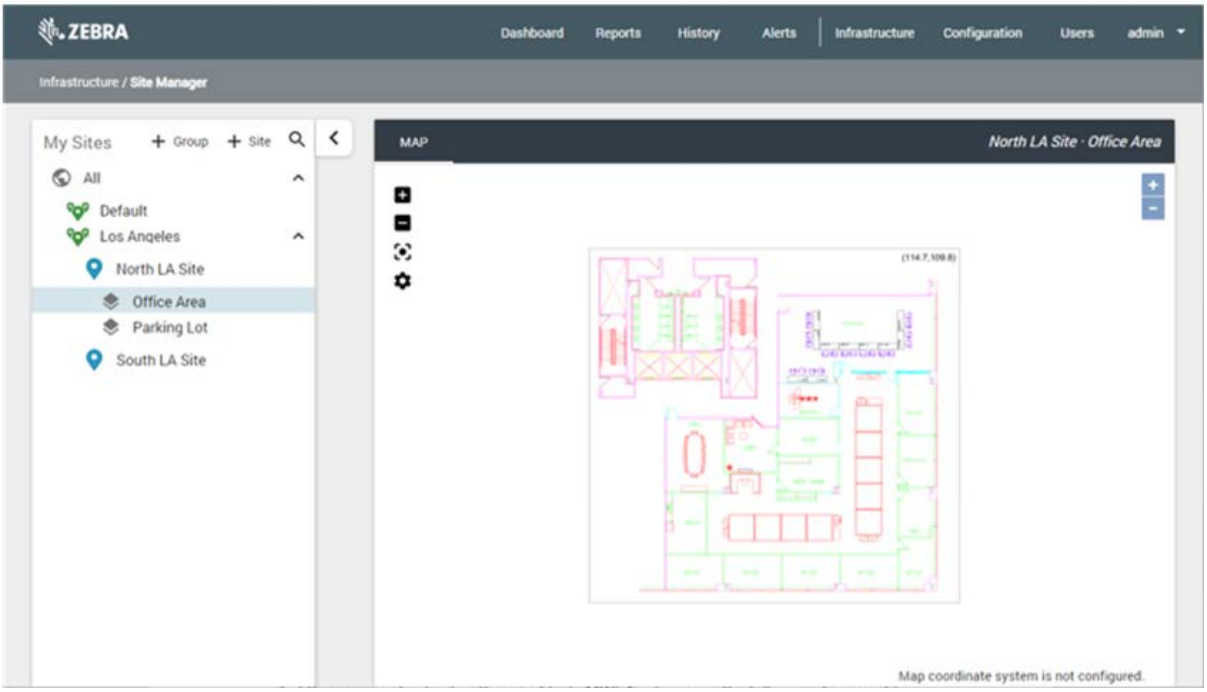


The **`Edit`** (pencil) and **`Delete`** (trash can) next to each map entry in the figure above and allow you to edit or delete a map file.

Once you are done adding maps for this site, click the **Save** button. The tree-view pane will now show the maps added under the North LA Site:



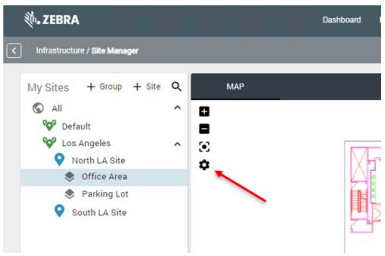
Clicking on a map entry displays the map image in the map window:



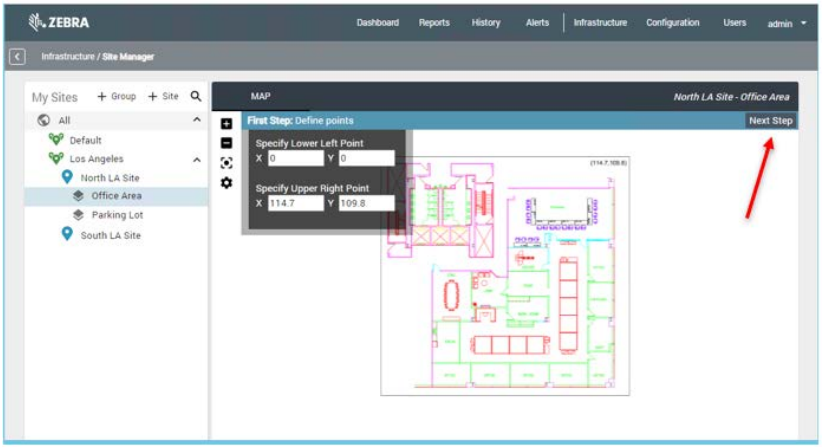
NOTE: In the figure above the label displayed on the lower right corner of the map window. It reads Map coordinate system is not configured. We have uploaded a map image, but we have not calibrated the map, that is, we have not defined an x,y coordinate system for each map in order to correctly display asset locations on the map image.

Calibrating a Map

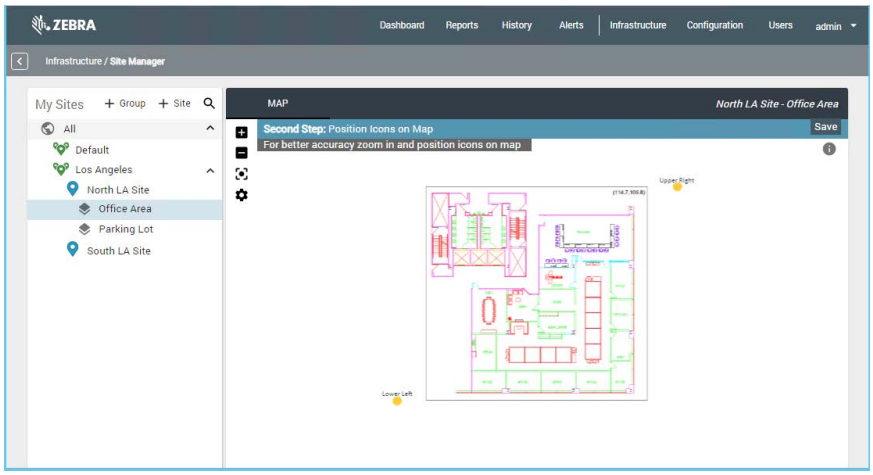
To calibrate a map, click the gear icon on the map window toolbar:



Enter the known (x,y) coordinates for two points on opposite corners of the map. The example uses the coordinates of the lower left and upper right corners of the square surrounding the map image, known from a site survey.

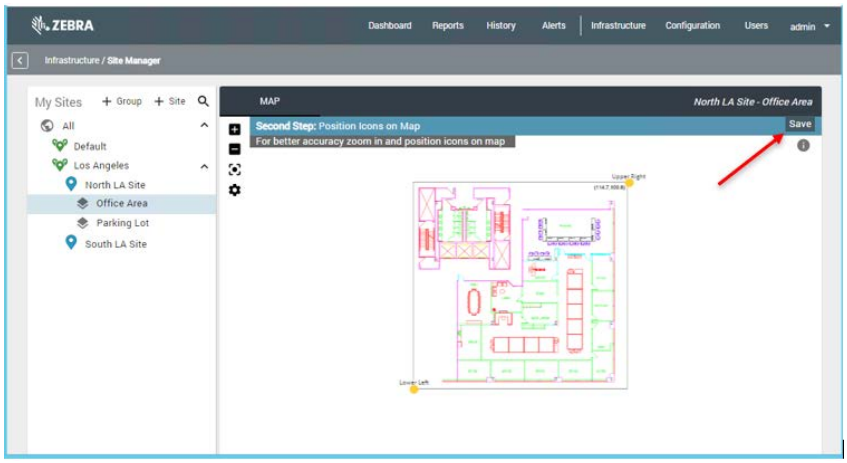


Click the **`Next Step`** button indicated by the red arrow in the figure above. You will see two yellow dots labeled **`Lower Left`** and **`Upper Right`** which you can drag to the correct position on the map:

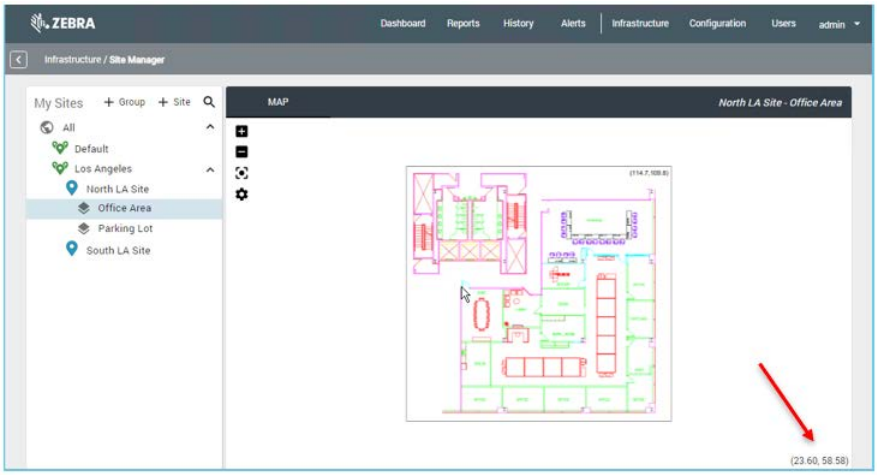


For better accuracy, zoom in when positioning the yellow dots. You can zoom in and out using your mouse wheel or the **+** and **–** buttons on the map toolbar.

Finally, click the **Save** button:



The map is now calibrated. As you move your mouse over the map, observe the (x,y) coordinates displayed on the lower right corner of the map window:



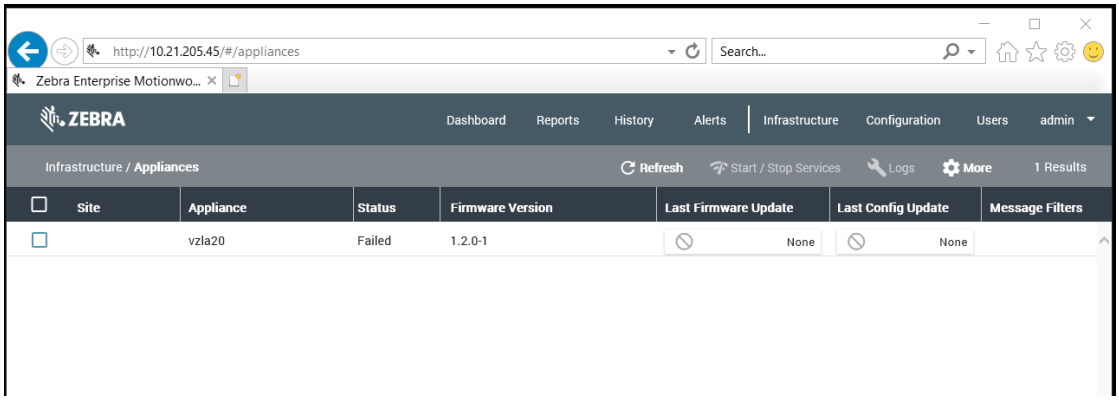
Registering a Zebra Location Appliance (ZLA)

A ZLA (Zebra Location Appliance) is an appliance that collects location and telemetry data from a variety of sensor types and location devices, runs location algorithms and filters data, and forwards data across a network to a MWE (Linux) server. A ZLA can be a physical device as in the picture below, or a virtual machine.

Zebra Location Appliance (ZLA)

A deployment of MWE may or may not require a ZLA. For example, MWE 2.0 supports deployment of fixed passive RFID readers without using a ZLA. Also, you could have a location sensor or third-party application feeding data to MWE via the MWE API. However, most type of sensors supported by MWE 2.0 do require a ZLA.

A ZLA needs to be registered with a MWE server for the ZLA to be able to forward data to that server, and for the MWE web client to be able to monitor, configure, and update the ZLA. If a ZLA was registered as part of the MWE software installation process (see the MWE 2.0 Installation Guide) then the ZLA will already be listed in the **Infrastructure → Appliances** page:



The Status column will show **`Failed`** or **`Activating`** until a site.json configuration files is published to the ZLA using System Builder. See System Builder on page 22.

NOTE: The ZLA firmware version must be 2.0.0-1 or higher. See the MWE 2.0 Installation Guide for details on upgrading the ZLA firmware.

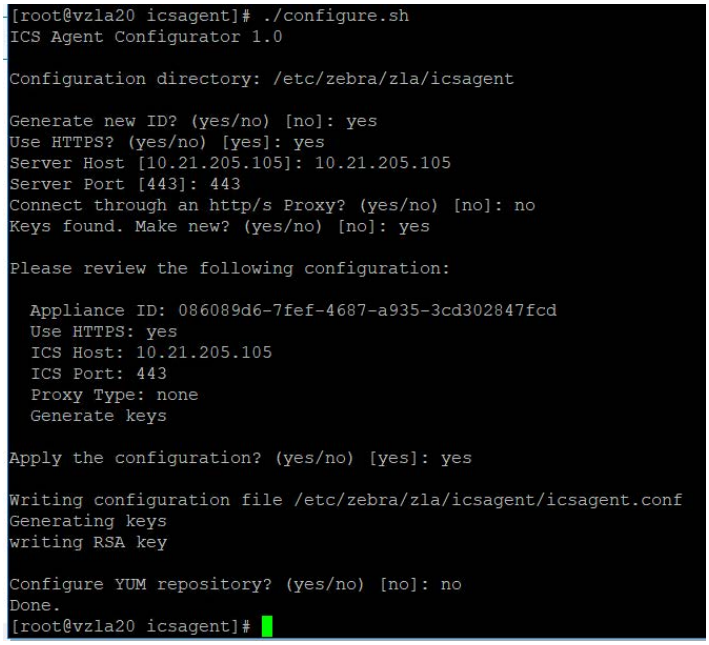
If the ZLA for a site has not yet been registered, here are the steps to register it (see the MWE 2.0 Installation Guide for more details):

1. Log into the ZLA using the root account (obtain login credentials from Zebra) and open a Terminal window. You can use Putty or similar SSH client to remotely access the ZLA.
2. Change directory to /opt/zebra/zla/icsagent and run the configure script:

   ```
   # cd /opt/zebra/zla/icsagent
   ```

```
#  ./configure.sh
```

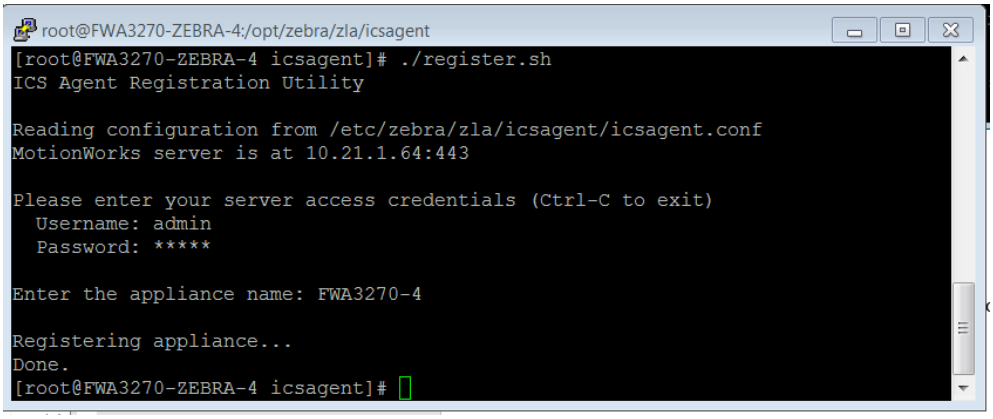
You will be prompted to enter some information and answer some yes/no questions. Answer as shown in the figure below. For `Server Host`, enter the fully qualified domain server name or IP address of your MWE Linux server.



3. Run the register script:

```
#  ./register.sh
```

You will be prompted to enter some information and answer some yes/no questions. When prompted, enter Username / Password (default is admin / admin) and enter a name of your choosing for the ZLA. This name will be displayed in the MWE web client.



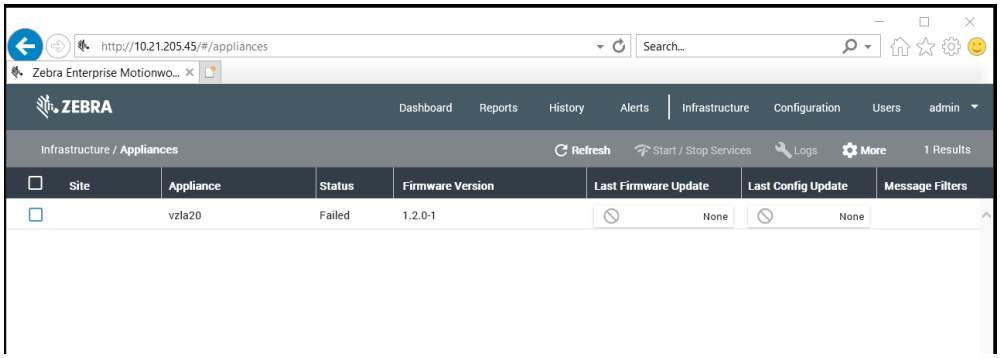
4. Restart the icsagent daemon:

```
#  systemctl restart icsagent
```

At this point, the ZLA should be listed in the **`Infrastructure > Appliances`** page of a web client pointing to the MWE server.

Associating a ZLA with a site

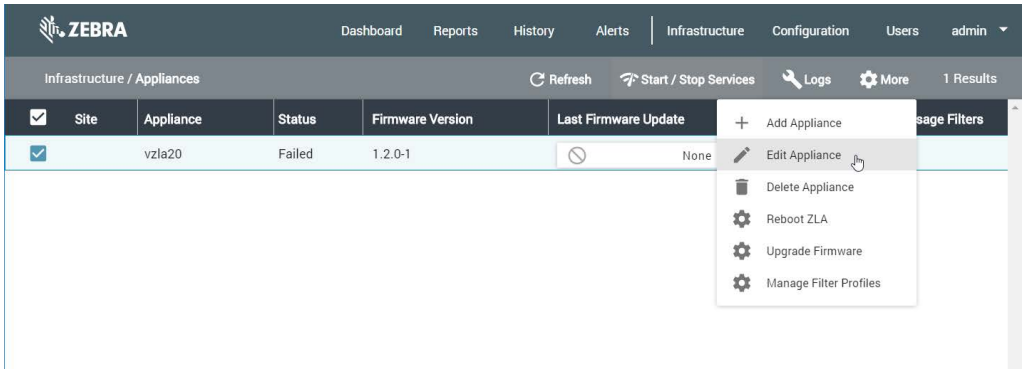
Once a ZLA has been registered with a MWE server, a web client pointing to that server will show the ZLA listed in the **`Infrastructure > Appliances`** report:

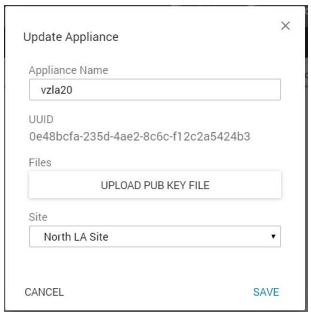


NOTE: The **`Status`** column will show **`Activating`** or **`Failed`** until a site configuration file is uploaded to the ZLA using the System Builder tool as explained in System Builder on page 22.

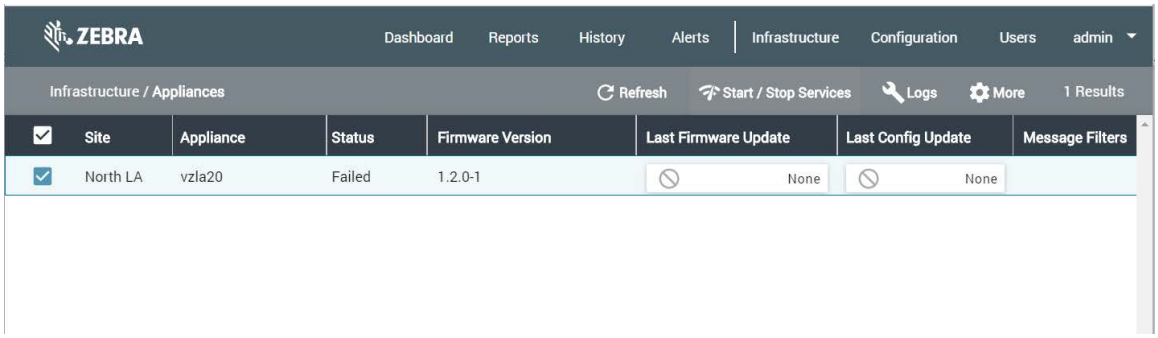
NOTE: The ZLA firmware version must be 2.0-1 or higher. Refer to the MWE 2.0 Installation Guide for details on upgrading the ZLA firmware.

The next step is to associate the ZLA with a site by specifying the site where the ZLA is located, so that tags and assets located by that ZLA will be reported by MWE in the correct site and on the correct map. For example, if the ZLA in the figure above, named **`vzla20`**, is physically located at our North LA Site, receiving and processing tag blinks from sensors at that site, we need to associate this ZLA with the North LA Site. To do so, select the **ZLA** (check the checkbox in the first column), click the **`More`** link on the report menu bar, and select **`Edit Appliance`** from the popup menu:





Click the down arrow in the **Site** field and select the correct site (North LA Site in our example) from the drop-down list. Click **Save**. The Appliances page will now show under the **Site** column the site associated with the ZLA:



A ZLA can be associated with only one logical site defined in the Site Manager page (see Adding site groups, sites, and site maps on page 8). In practice, you can have several physical sites associated with a single ZLA by adding multiple maps (one or more maps per physical site) under a logical site in the **Site Manager** page.

System Builder

The System Builder tool is used to define the configuration file consumed by a ZLA (Zebra Location Appliance). If your MWE deployment does not require a ZLA, then you do not need to use System Builder.

If your deployment does require a ZLA, then the next step in the system configuration is to use System Builder to perform the following tasks:

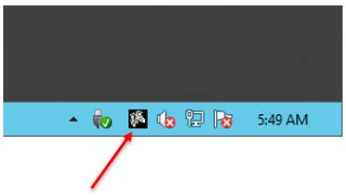
- On the map, add and place the location sensors and other infrastructure devices that are or will be installed at the site.
- Specify the location algorithms to be used at the site. This is necessary only for some types of sensors.

This section describes the basic steps in System Builder required to perform the above tasks. For more detailed information on System Builder functionality, refer to the System Builder User Guide.

Launching System Builder

The System Builder tool is installed by the MWE Tools installation program and can be run on the MWE Windows Application Server or on any laptop.

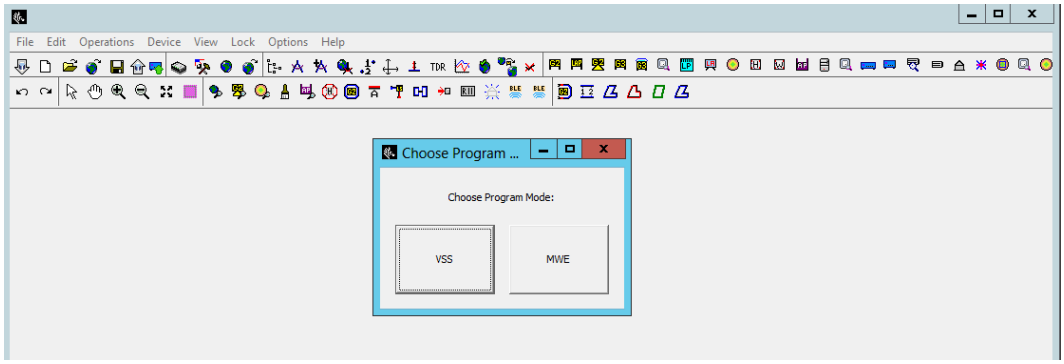
1. To launch the tool, click the Zebra icon on the Windows taskbar. The tool launcher opens.



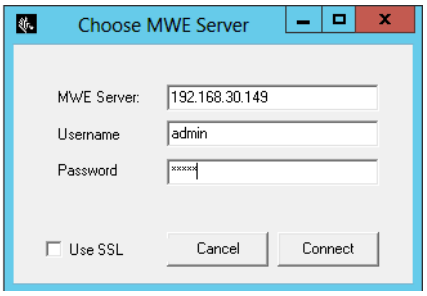
2. Select the **`Installation`** tab and click the System Builder link:

Alternatively, use the Windows search tool to search for and launch System Builder.

3. When prompted, select **MWE mode** (as opposed to VSS legacy mode):

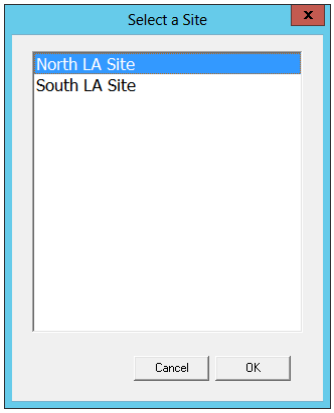


4. Click the **Download** tool button (down arrow icon) to download maps from the MWE server. You will be prompted to connect to the MWE server.
5. Enter the server name or IP address of the MWE (Linux) server. The admin login account is the same as for the web client.



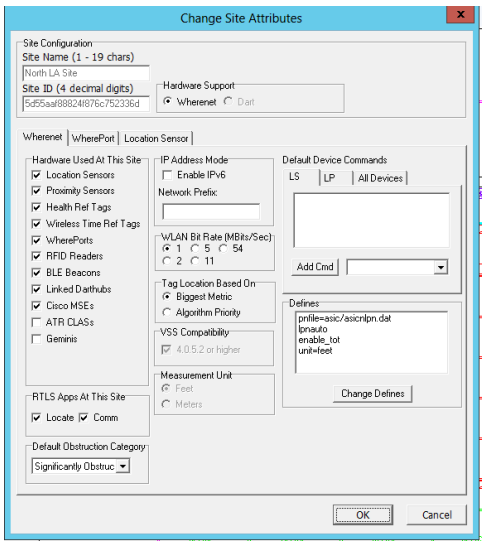
6. Click **Connect.**

   You will be prompted to select a site from a list of all the sites you have previously added in the web client. In this case, this list includes North LA Site and South LA Site. For this example, select **North LA Site**. Click **OK**, and observe the Site Attributes dialog window.

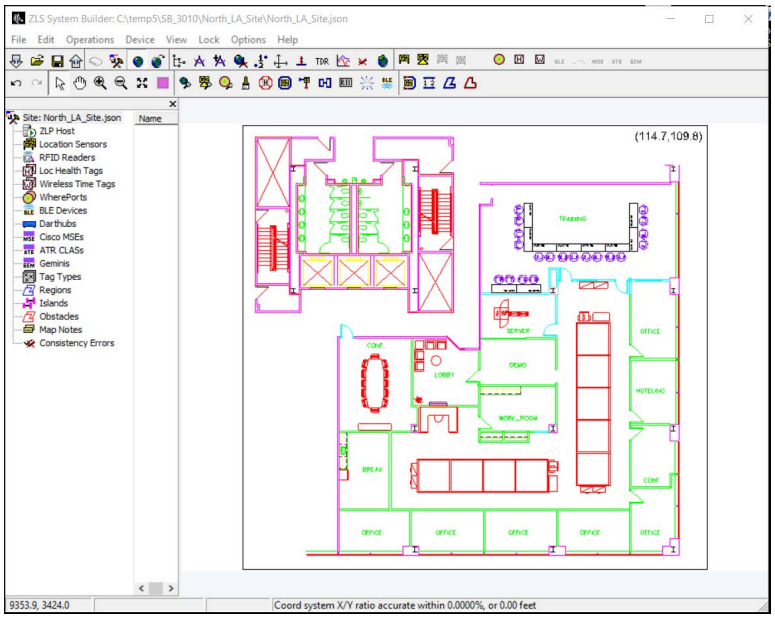


7. At the top center of the dialog window, verify that the WhereNet option is selected in the **Hardware Support** pane.

8. Accept all default settings and click **OK**:

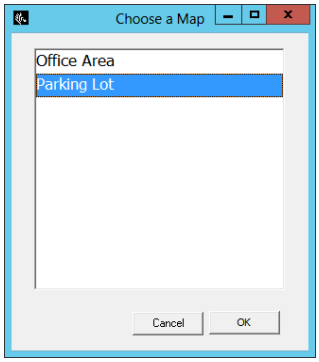


The System Builder displays one of the maps (Office Area map) belonging to the North LA Site (see Adding site groups, sites, and site maps on page 8).



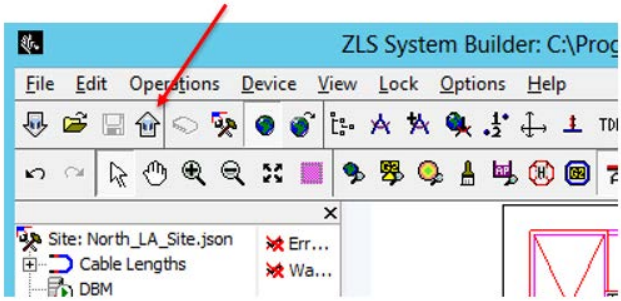
9. To switch to the second map (Parking Lot map) belonging to the North LA Site (see Adding site groups, sites, and site maps on page 8), click the **Switch Map** tool button.

Observe the list of all maps previously added under the North LA Site. Select the desired map to view:



After making any changes, publish to the MWE server or you can save locally to publish later.

10. To publish your changes, click the **`Publish`** tool button:



You will be prompted with a couple of confirmation windows.

11. Accept the default options and click **Upload/OK** when prompted.

When publishing in System Builder, the configuration information entered for the site is uploaded not only to the MWE server, but also to the ZLA associated with the site. The location algorithms that run on the ZLA need this information.

If you prefer to save your work to a local folder and publish later, select **`File > Save As...`** from the main menu. System Builder will save all information in a text file, usually referred to as the site file, and it will also automatically save to the same folder all map files (.wmf) associated with the site. The information in the site file is in json format. You can later load the site file into System Builder by selecting **`File > Open Site File…`** from the main menu.

Adding Infrastructure Devices

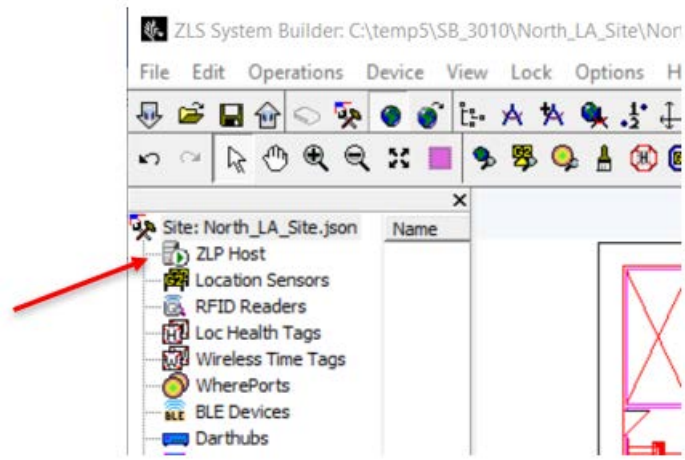
Devices that are installed as part of the location infrastructure may include different types of sensors or devices supported by MWE, such as 24730 sensors, UWB sensors, passive RFID sensors, DART hubs, BLE beacons, BLE bridges or mobile receivers, Zebra CLAS servers, Zebra Gemini, tag magnetic exciters, time reference tags, and more. This section provides examples of how these devices are entered into the system.

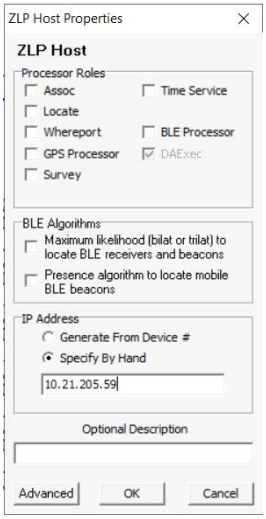
Entering the ZLA IP address

Before we add any devices, we need to enter in System Builder the IP address of the ZLA. As mentioned in the previous section, when doing a Publish operation in System Builder, the system design information entered into System Builder (such as location devices and location algorithms) is uploaded not only to the MWE server but also to the ZLA associated with the site. This information is uploaded to the ZLA in the form of a json file, named **`site.json`** and commonly referred to as the site file.

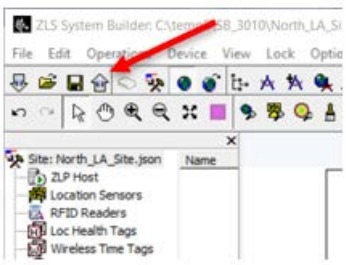
This site**`.json`** file is read by the ZLS Service and the Blink Service on the ZLA; these are the services that run the location algorithms. The Blink Service will check that the ZLA IP address in the site.json file matches the actual IP address of the ZLA; if they don't match, the Blink Service will not run.

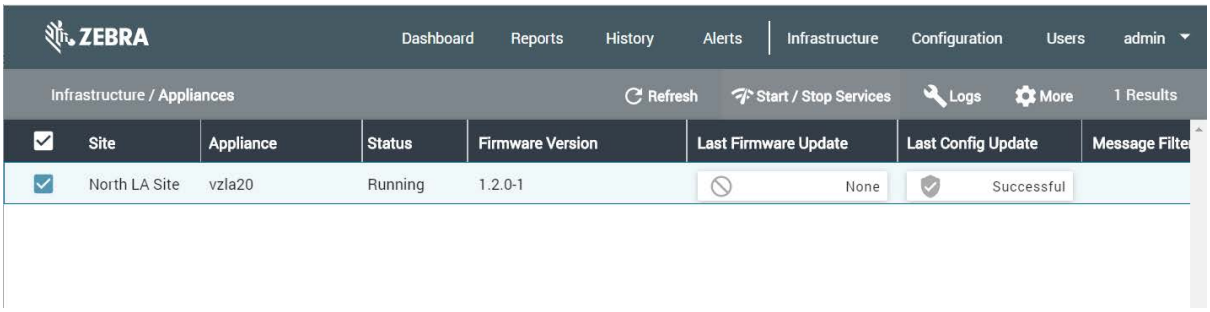
1. To enter the ZLA IP address into System Builder, double-click the `ZLP Host` item in the tree-view pane:





2. Type in the correct ZLA IP address in the **IP Address** field and click **OK**:
3. If you click the **Publish** tool button (up arrow) on the top toolbar, the map calibration and ZLA IP address is uploaded to the MWE server and to the ZLA, and the **Infrastructure** > **Appliances** page in the web client should show **Status = Running**, and **Last Config Update = Successful** for the ZLA:





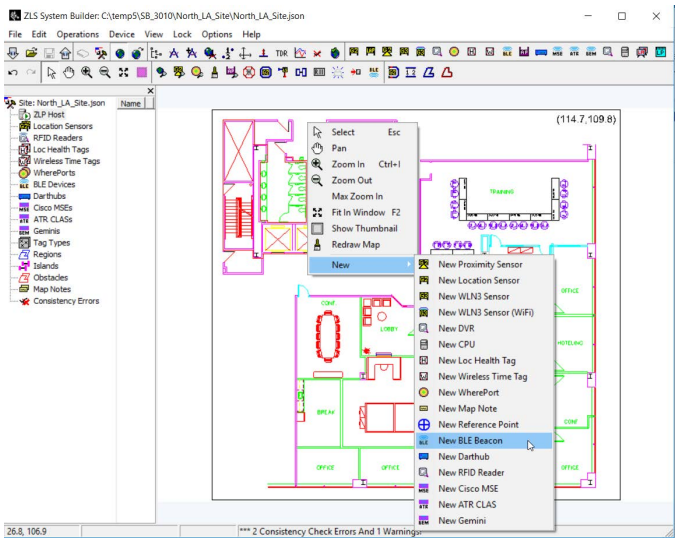
Adding BLE Beacons

This section describes how to add BLE beacons. In one typical deployment scenario, BLE beacons are placed at fixed locations throughout a facility. When a WhereNet tag with a built-in BLE scanner comes close to a BLE beacon, the tag will read the beacon's MAC address and other parameters, and include this information in the tag blink (tag RFID transmission). A WhereLAN sensor hearing the tag blink will forward the digitized information to a ZLA across the network. The Blink Service on the ZLA will read the MAC address from the tag blink and assign to that tag the x,y coordinates of the BLE beacon having that MAC address in the site.json configuration file published by System Builder. Finally, the Blink Service will forward the tag ID, and x,y coordinates to the MWE server. This is essentially a presence location algorithm.

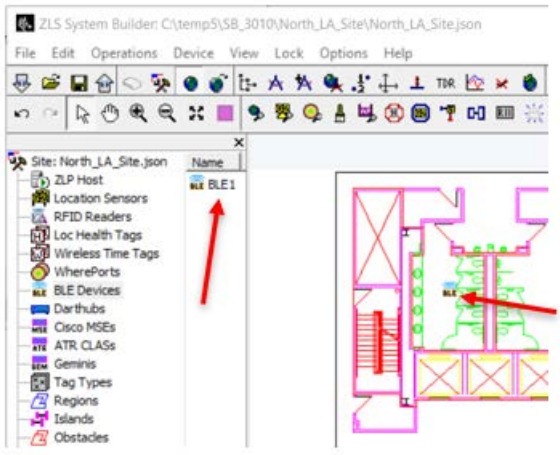
Fixed BLE beacons can also be used to perform full locate (Presence, 2-D, 3-D) of BLE receivers, which are devices that scan for Bluetooth smart beacon emissions and forward the data via a WiFi access point to a (http) server or ZLA on the network. The receiver will forward the MAC addresses and RSSI signal intensity of the fixed beacons it detected, and the Blink Service on the ZLA will then calculate the location of the receiver using the known locations and RSSI values of the fixed beacons.

To add a BLE beacon in System Builder:

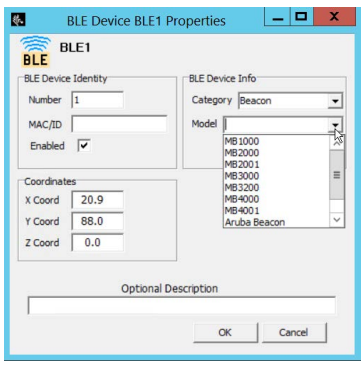
1. Right-click on the spot on the map where you want to place the BLE beacon, and select **New** > **New BLE Beacon** from the popup menu:



A BLE beacon icon is shown on the map where you right-clicked, and **BLE1** is shown in the lists of BLE beacons in the middle pane:



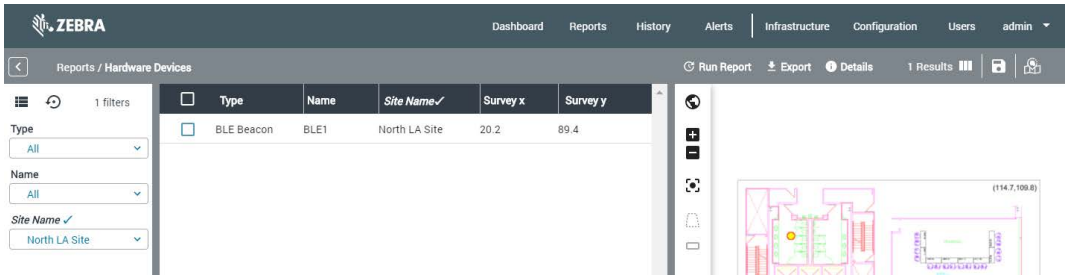
2. Drag the BLE icon on the map to the desired location.
3. Double-click on the **BLE** icon on the map or on **BLE1** in the middle pane. The **BLE Properties** window will open:



4. In the **Category** drop-down list, select **Beacon**.
5. In the **Model** drop-down list, select your beacon model.
6. In the **Beacon MAC/ID** field, type in the Beacon MAC address.

   The x,y values shown are the ones of the spot where you placed the BLE beacon on the map. If you have more accurate x,y values (from a survey, etc), you can type them in the above window, and click **OK.**

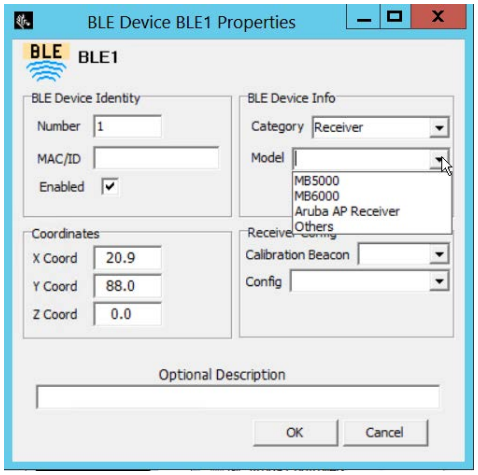
   Add as many additional BLE beacons on each map as necessary. When you publish, all devices that you have added will be shown in the **Config > Hardware Devices** page in the web client:



Adding BLE Receivers

A BLE receiver scans for BLE beacon emissions, filters beacons based on its scanning configuration, and forwards data (such as a beacon's MAC address) via a Wi-Fi access point to a (http) server or ZLA on the network. Fixed BLE receivers placed at know locations can be used to locate mobile BLE beacons. BLE receivers are also referred to as BLE bridges.

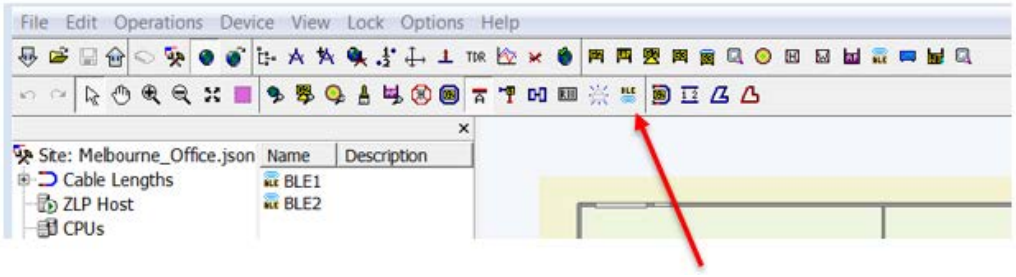
BLE Receivers are added in System Builder in the same manner and using the same dialog window as explained above for BLE Beacons, with the difference that in the **Category** drop-down list you need to select **Receiver**. In the **Model** drop-down list, select your receiver model:



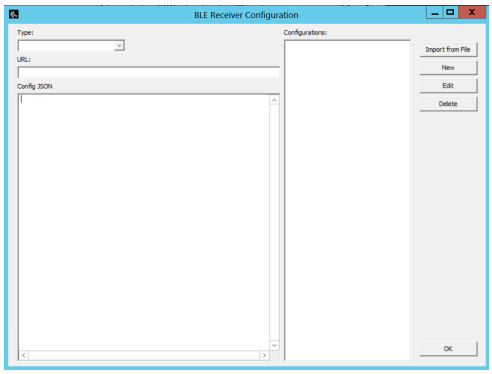
A BLE receiver requires a receiver configuration file that specifies operating parameters and an IP address where to post the data. Use the configuration drop-down list to select a configuration file for the receiver. This list initially will be empty, as System Builder does not include any default configuration files. This receiver configuration file is typically named **ReceiverConfig.json**, with an added suffix when working with multiple configuration files.

A BLE receiver needs to get initialized or 'bootstrapped' by downloading a bootstrap configuration file named **badge_config.json** as explained in Appendix: BLE Receiver Configuration on page 63. This file instructs the receiver on how to access a particular WiFi network and provides the receiver with the IP address of the ZLA where to get the ReceiverConfig.json file. See Appendix: BLE Receiver Configuration on page 63 for more details on the bootstrapping step.

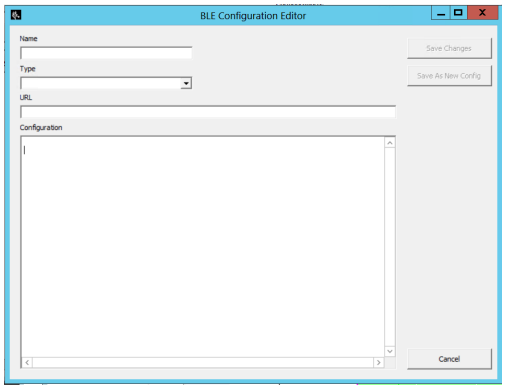
1. To load or create a **ReceiverConfig.json** file in **System Builder**, click the **BLE Receiver** tool-button in **System Builder** shown in the figure below:



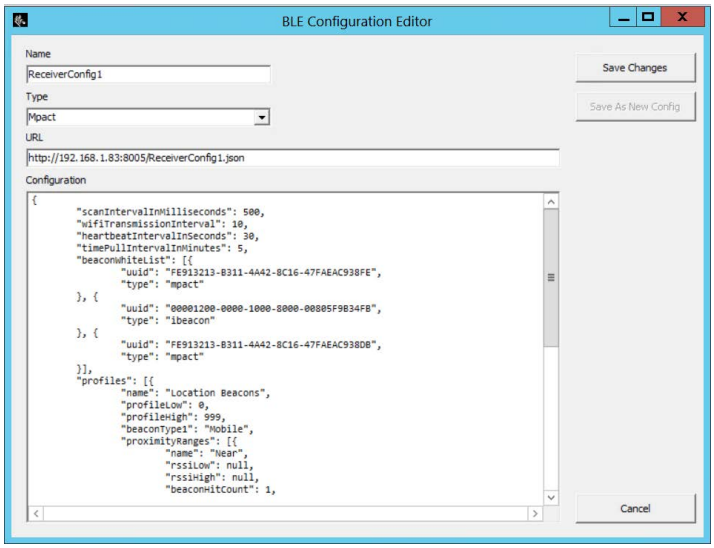
This will open the **BLE Receiver Config** window:



2. You can click the **Import from File** button to load previously defined configuration files. Otherwise, you can create a new file as explained below.
3. To create a new receiver configuration file, click on the **New** button to open the **BLE Configuration Editor:**



4. In the **Name** field, enter a unique name for the configuration file, such as **ReaderConfig1**.



5. In the **Type** drop-down list, select a type of receiver: Mpact or Aruba.

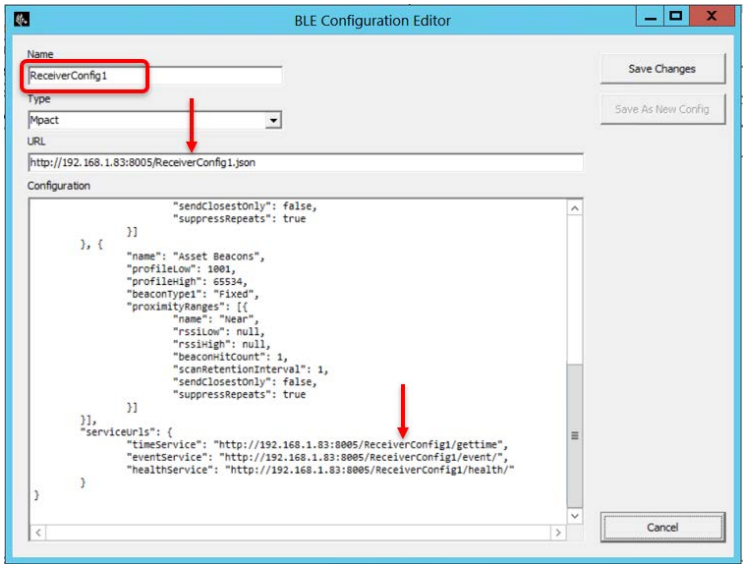
   Select **Unknown** for other types or if you don't know the type. Selecting the correct type helps the ZLA process data more effectively.

6. In the URL input box, copy and paste the value of the **receiverConfigURL** field from the **badge_config.json** bootstrap file. See Appendix: BLE Receiver Configuration on page 63 for details. For example, this value could be:

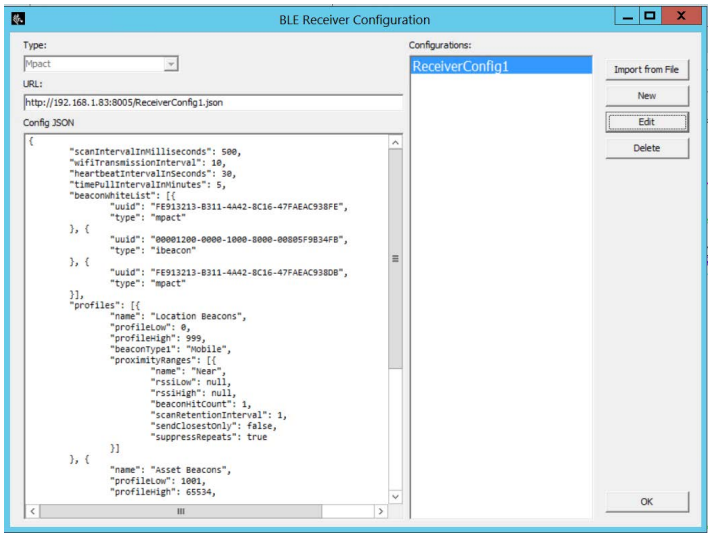
   `http://192.168.1.83:8005/ReceiverConfig1.json`

   The IP address in the URL above is the IP address of the ZLA. Port 8005 must be open on the ZLA. **ReceiverConfig1.json** is the name of the configuration file to be retrieved by the receiver.

7. In the **Configuration** input box, type or paste the contents of **ReceiverConfig1.json** (see the sample **ReceiverConfig.json** in Appendix: BLE Receiver Configuration on page 63). Note that the name of the configuration file in the URL must be included in each of the serviceUrls as shown in the figure below:

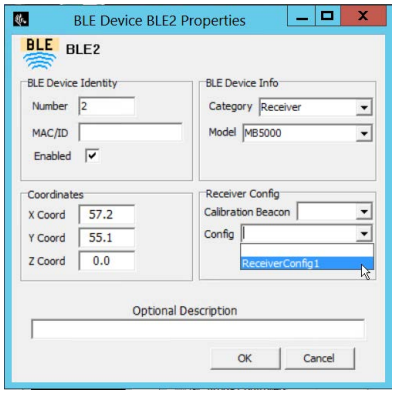


8. Click **Save Changes.** At this point your newly created **ReceiverConfig1.json** will be listed in the **BLE Receiver Configuration** window:



9. Click **OK**. You can similarly create multiple ReceiverConfig.json files. You are free to give these files meaningful names of your choosing, but each name must be unique.

   You should now be able to select a receiver configuration file for each BLE receiver that you add in System Builder.

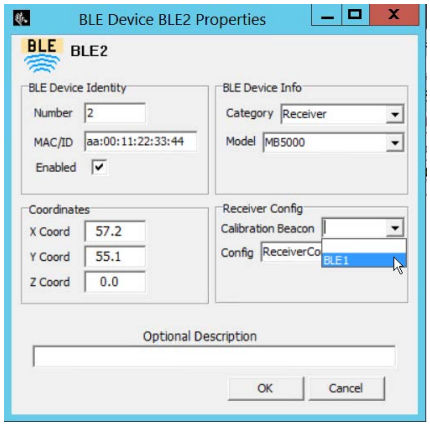


This section describes the Calibration Beacon field in the receiver properties window shown above. As mentioned earlier, one can use a set of fixed BLE beacons at a site to locate mobile receivers. However, as mentioned in the next section, one can also use a set of fixed receivers to locate mobile beacons. In this latter case, using a calibration beacon can increase locate accuracy.

A calibration beacon is a BLE beacon placed at a fixed distance from a fixed receiver (check with Zebra for the correct distance). This beacon should be configured with the same power settings as the mobile beacons to be tracked and located. This allows the location algorithm to know the intensity of the BLE beacon signal at a given distance from the BLE receiver.

NOTE: BLE beacon power and other settings are configured using an Android mobile application discussed in separate documentation.

10. To add a Calibration Beacon in **System Builder**, simply add a BLE beacon as explained in Adding BLE Beacons on page 27. Then you will be able to select it in the **`Calibration Beacon`** drop-down list in the receiver properties window:



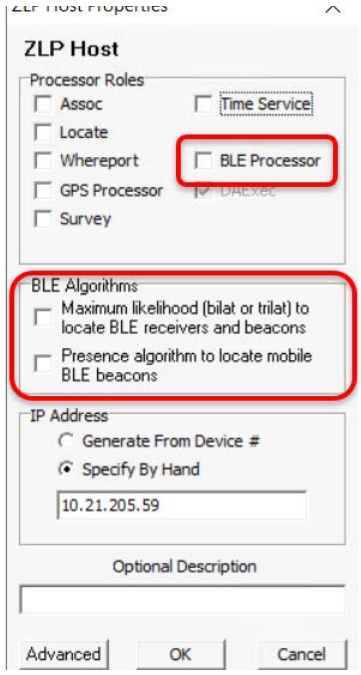
Locating with BLE Beacons and BLE Receivers

We have described in the two previous sub-sections how to add infrastructure BLE beacons and BLE receivers to the system using the System Builder tool. This section describes location algorithms supported for various combinations of BLE beacons and receivers.

First a note on nomenclature:

- An infrastructure or fixed beacon or receiver is a beacon or receiver that is installed at a fixed position at a site and is added in System Builder as part of the site's location infrastructure.
- And asset or mobile beacon or receiver is a beacon or receiver that can move around a site and is being tracked and located by the infrastructure or fixed beacons and receivers.

Secondly, the different algorithms involving BLE beacons and receivers are enabled/disabled via checkboxes in the **`ZLP Host Properties`** window:



The table below presents some possible deployment scenarios and the supported location algorithms. It also indicates what checkbox to check in the ZLP Host Properties window to enable the algorithms.

Deployment Scenario	Supported Location Algorithms	Option to select in ZLP Host Properties Window
You would like to locate mobile receivers using fixed beacons.	**Presence** Mobile receivers are located using fixed beacons and the Presence algorithm, that is, a mobile receiver is reported to be at the x,y coordinates of the closest fixed beacon.	This is the default algorithm. No option needs to be selected in the ZLP **`Host Properties`** window.
	Full locate In this case, mobile receivers are located using fixed beacons and the MLE (Maximum Likelihood) algorithm. This algorithm first attempts a trilat solution (on a plane), then a bilat solution (on a line), then a Presence solution (x,y set equal to closest fixed beacon), in that order. If the algorithm can calculate a trilat solution, it will report it; otherwise it will attempt a bilat solution. If it can't obtain a bilat solution, it will use a Presence algorithm. **NOTE:** When MLE is enabled, mobile beacons in the vicinity of mobile receivers that have been located by MLE will be reported at the same location as the mobile receivers. In other words, mobile beacons will automatically be located using the mobile receivers of known location and a Presence algorithm.	Select **`Maximum likelihood…`**

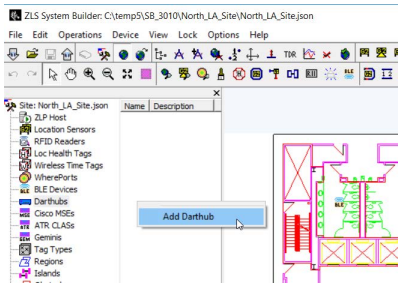
Deployment Scenario	Supported Location Algorithms	Option to select in ZLP Host Properties Window
You would like to locate mobile beacons using fixed receivers.	**Presence** Mobile beacons are reported to be at the x,y coordinates of the closest fixed receiver.	Select **`Presence algorithm to locate mobile BLE beacons`**
	Full locate In this case, mobile beacons are located using fixed receivers and the MLE (Maximum Likelihood) algorithm. This algorithm first attempts a trilat solution (on a plane), then a bilat solution (on a line), then a Presence solution (x,y set equal to closest fixed beacon), in that order. If the algorithm can calculate a trilat solution, it will report it; otherwise it will attempt a bilat solution. If it can't obtain a bilat solution, it will use a Presence algorithm.	Select Maximum likelihood
You would like to locate Coffey tags (WhereNet tags with built-in BLE scanner) using fixed beacons.	**Presence** In this scenario, Coffey tags (WhereNet tags with a built-in BLE scanner) are located by fixed beacons using Presence, that is, a tag will be reported to be at the x,y position of the closest fixed beacon.	Select **`BLE Processor`**

Adding DART Hubs

A DART hub receives DART tag blinks from various DART sensors connected to it, runs the configured location algorithms, and generates locate packets (tag blinks with x,y coordinates) that are made available via a TCP port for other applications to consume. A ZLA can connect to this port, retrieve the DART blinks, optionally apply filtering, and forward them to the MWE server.

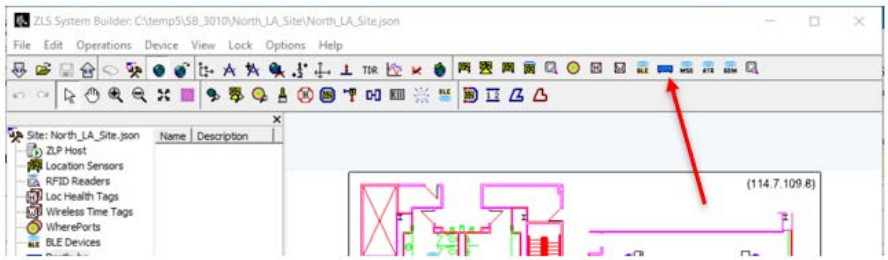
For a ZLA to connect to a DART hub, the hub needs to be added in System Builder. To do so, you can so one of the following:

- Click **`Darthubs`** in the tree-view, then right-click in the middle pane, and select **`Add Darthub`** from the popup menu:

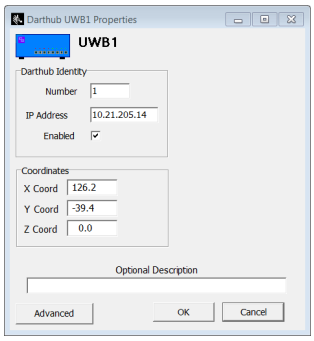


- Right-click anywhere on the map window where you would like to place a DART hub, and select **`New > New Darthub`** from the popup menu.

- Click the **Create Darthub** button on the toolbar.



In the **Darthub Properties** window, enter the IP address of the DART hub and click **OK**.



Adding Passive RFID Readers

Passive RFID readers scan and capture data from passive RFID tags near the readers, including the ID of reader and antenna capturing the data, the tag ID, and other encoded tag data. The ZLS Service on the ZLA gets this tag data across the network from the readers, assigns the x,y coordinates to the tag data per the antenna ID in the **site.json** file, and optionally applies data filters configured in the **site.json** file. Finally, the ZLS Service forwards the data to the MWE server.

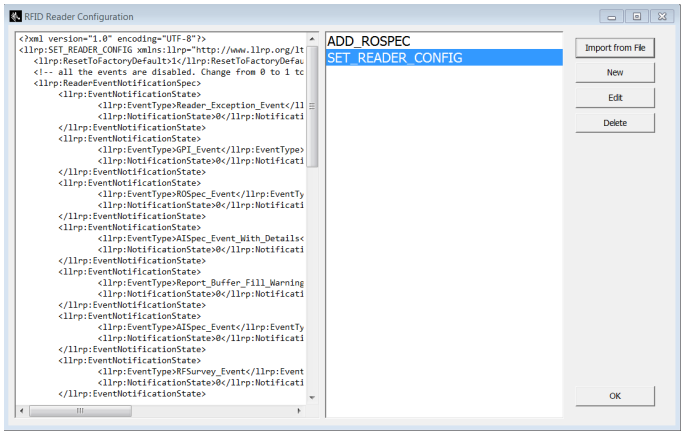
This section describes the basic steps to add an RFID Reader in System Builder. For more details, please consult the VSS 4.2 Support for Passive RFID Tags rev.1.2 document available from Zebra Product Support.

Typically, a passive RFID reader will require two configuration files, usually named **ADD_ROSPEC.xml** and **SET_READER_CONFIG.xml.** If you are planning to also read the User Memory block on a passive RFID tag, you will need a third configuration file typically named **ADD_ACCESSSPEC.xml**.

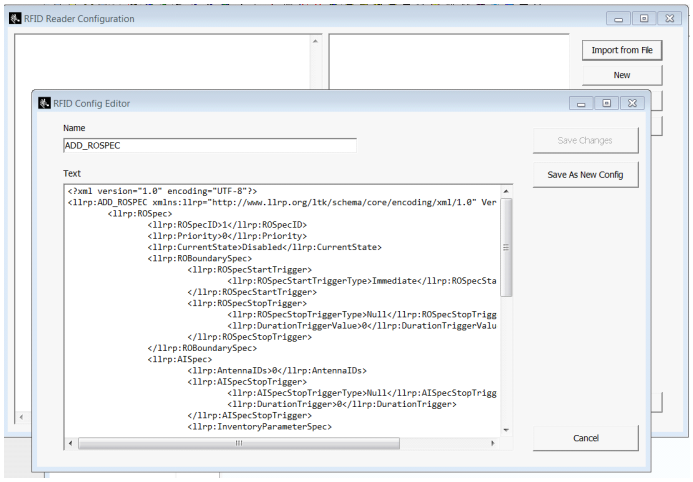
The parameters controlled by these configuration files will not be discussed here; it is assumed that the user has some basic familiarity with passive RFID readers and configuration files. It is possible to load multiple configuration files into System Builder and then assign them to passive RFID readers defined in System Builder.

1. To load passive RFID reader configuration files in **System Builder**, click the **`Manage RFID Reader Configs`** button on the toolbar, shown in the figure below.

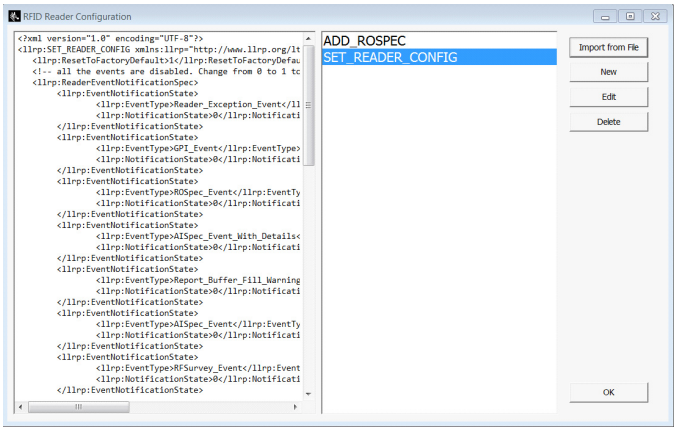
This opens the **`RFID Reader Configuration`** window.



2. Click **`Import From File`**, browse to the file you want to load (**`ADD_ROSPEC.xml`** in the example below), optionally edit it, and then click **`Save As New Config.`**

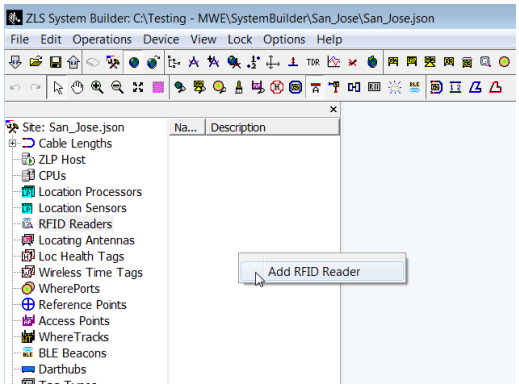


You can repeat the above steps for **`SET_READER_CONFIG.xml`** and additional versions of these two configuration files. The RFID Reader Configuration window will show a list of the configuration files that have been loaded into System Builder:

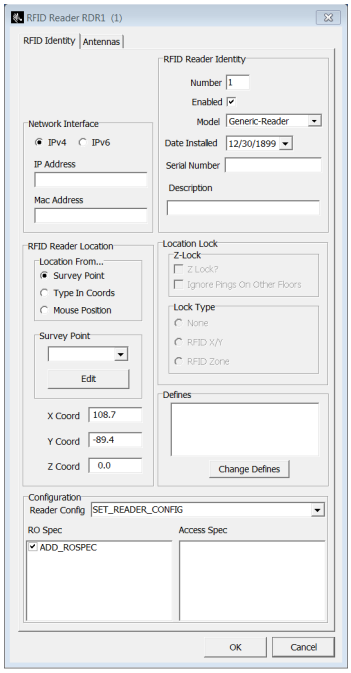


If you are planning to read the User Memory block on a passive RFID tag, you must add an **`ADD_ACCESSSPEC.xml`** configuration file.

1. To add a passive RFID reader in System Builder, select the **`RFID Readers`** item in the tree-view, right-click in the middle pane and select **`Add RFID Reader`** from the popup menu:



The RFID Reader properties window opens.

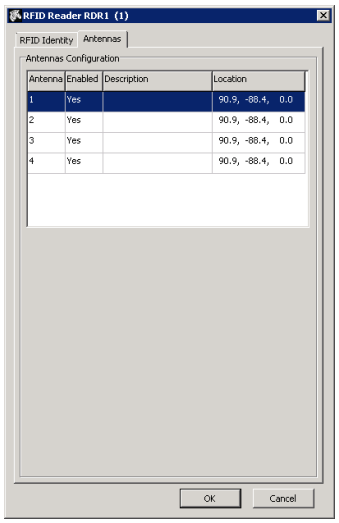


The RFID Reader properties window has two tabs, namely, **`RFID Identity`** and **`Antennas`**, as seen in the figure above. In the RFID Identity tab, the following parameters are required:

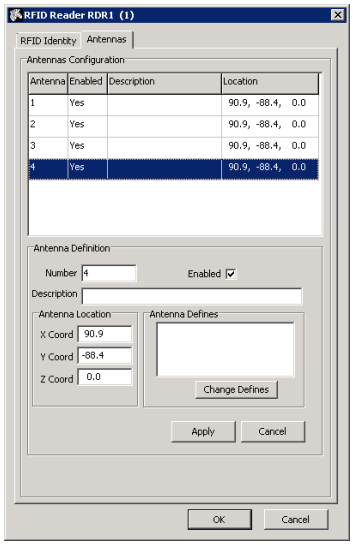
- IP address
- Model: the drop-down list shows the RFID reader models currently supported. Most of the times selecting Generic Reader will suffice for any RFID reader supporting the LLRP protocol.
- Coordinates (x,y) for the reader body (not antennas). You can type in the x,y coordinates, or you can drag the RFID Reader icon on the map to the desired position.
- A SET_READER_CONFIG file. A single such file can be selected per reader.
- At least one ROSpec file
- At least one Access Spec file if you would like the reader to read a tag's User Memory block

Optionally, commands and configuration parameters can be entered in the Defines section for each reader.

The figure below shows the **Antennas** tab:



Each antenna entry in the **Antennas** page can be edited by double-clicking on the corresponding line.



Enable as many antennas as are connected to the reader and make sure to enter the correct x,y,z for each antenna. Optionally, antenna commands or configuration parameters can be entered in the **Antenna Defines** section for each antenna. Click **OK** once you have entered all required information.

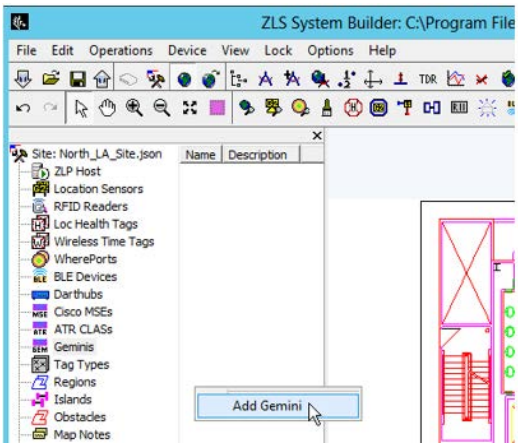
You can add as many additional RFID Readers on each map as necessary. When you publish, all devices that you have added will be shown in the **Config > Hardware Devices** page in the web client.

Adding Gemini Devices

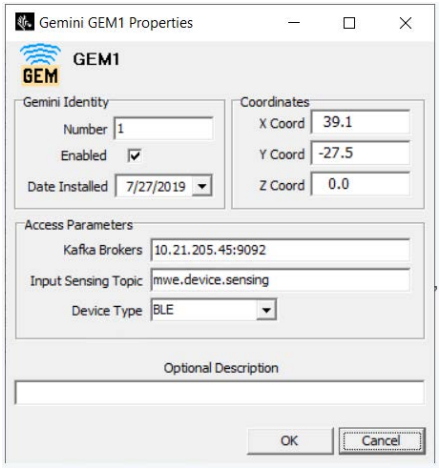
Zebra's Gemini is a software module that consumes location data from certain devices, such as Zebra BLE beacons and receivers, and can forward it to a Kafka server in a predefined json format (Gemini format). In this context, such devices are sometimes referred to as Gemini devices. Please see the Gemini documentation for details on configuring the Gemini software.

The ZLA in the MWE system can read data from the Kafka topic being populated by Gemini on a specified server, process it, and forward it back to the MWE Linux server as standard tag blink locate packets. Therefore, the Gemini data will be displayed in the MWE web client reports and map, be available via the MWE REST API and Camel interface, be used to define rules in the Business Rules Engine, and more.

To add a Gemini device in System Builder, click in the **Geminis** item in the tree-view, then right-click on the middle pane and select **Add Gemini** from the popup menu:



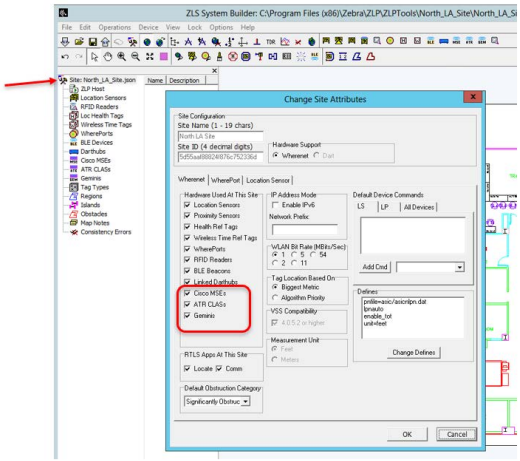
This opens the **Gemini Properties** window:



The info provided in this window is used by the ZLA to retrieve Gemini data from the specified Kafka server and Kafka topic.

Kafka Brokers	Enter the IP address of the server hosting the Kafka topic being populated by Gemini and the port where Kafka is listening. The format is **IP_Address:Port** as shown in the figure above. The IP address will normally be the IP address of the MWE Linux server, but it could be of any server hosting a Kafka instance. The Kafka port is typically 9092, and it will be 9092 for Kafka hosted on the MWE Linux server. It is possible to specify several kafka servers by entering: **IPAddress1:Port1,IPAddress2:Port2**
Input Sensing Topic	Enter the name of the Kafka topic being populated by Gemini. This name can be configured in a Gemini configuration file; please see the Gemini documentation for details. In figure above, for example, the name of this topic is **mwe.sensing.device**.
X,Y,Z Coordinates	These coordinates are for information purposes only and are optional, as the server hosting Gemini can be a remote server and the location of this server has no bearing on the data being reported by Gemini. If you leave these coordinates blank, System Builder will default them to 0.

NOTE: Gemini devices, as well as Zebra CLAS servers and Cisco MSE servers, are supported in System Builder version 3.0.1 and later. If you don't see these items in the System Builder tree-view, please double-click the Site entry at the top of the tree-view to open the **`Change Site Attributes`** window, and verify that the desired devices are selected, as shown in the figure below.

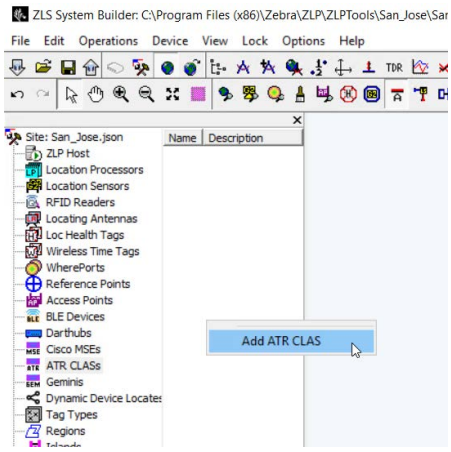


Adding CLAS Servers

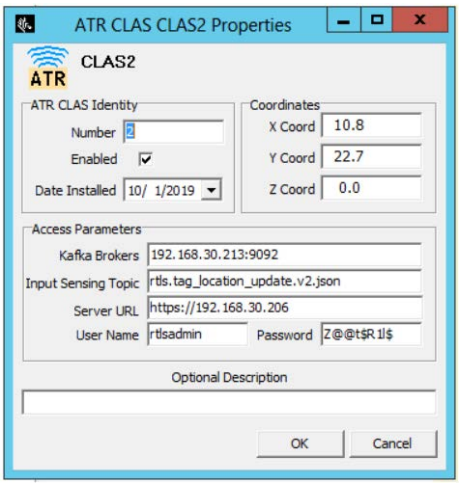
Zebra's ATR CLAS (Configuration, Location Analytics Software) is a server software module that collects data from ATR RFID readers and can post this data to a remote Kafka server, using the default topic name **`rtls.tag_location_update.v2.json`**. Refer to the the CLAS documentation for details on configuring the CLAS software.

The ZLA in the MWE system can read data from the Kafka topic being populated by CLAS on a specified server, process it, and forward it back to the MWE Linux server as standard tag blink locate packets. Therefore, the ATR RFID reader data will be displayed in the MWE web client reports and map, be available via the MWE REST API and Camel interface, be used to define rules in the Business Rules Engine, and more.

To add a CLAS server in System Builder, click on the **`ATR CLAS`** item in the tree-view, then right-click in the middle pane and select **`Add ATR CLAS`** from the popup menu:



This opens the **`ATR CLAS Properties`** window:



The info provided in this window is used by the ZLA to retrieve CLAS data from the specified Kafka server and Kafka topic.

Kafka Brokers	Enter the IP address of the server hosting the Kafka topic being populated by CLAS and the port where Kafka is listening. The format is **`IP_Address:Port`** as shown in the figure above. The IP address will normally be the IP address of the MWE Linux server, but it could be of any server hosting a Kafka instance. The Kafka port is typically 9092, and it will be 9092 for Kafka hosted on the MWE Linux server. It is possible to specify several kafka servers by entering: **`IPAddress1:Port1,IPAddress2:Port2`**
Input Sensing Topic	Enter the name of the Kafka topic being populated by Gemini. By default, CLAS posts data to a Kafka topic named **`rtls.tag_location_update.v2.json`**
X,Y,Z Coordinates	These coordinates are for information purposes only and are optional, as the server hosting CLAS can be a remote server and the location of this server has no bearing on the data being reported by CLAS. If you leave these coordinates blank, System Builder will default them to 0.
CLAS Server URL, User Name, and Password	These parameters are optional. If provided, and if the CLAS version is 2.2.28 or higher, then the ZLA will automatically contact the CLAS server and supply the Kafka Brokers and Input Sensing Topic values entered in the ATR Properties window so that CLAS posts data to the specified Kafka server and Kafka topic.

If the CLAS Server URL, User Name, and Password are not provided in the ATR CLAS Properties window, or the CLAS server is running a version lower than 2.2.28, then the following parameters must be manually configured in the **`rtls.conf`** configuration file on the CLAS server:

```
location_endpoint_addr = <MWE-LinuxServer-IP>:9092
location_endpoint_topic = rtls.tag_location_update.v2.json
location_analytics_site_id = <MWE-MapID>
```

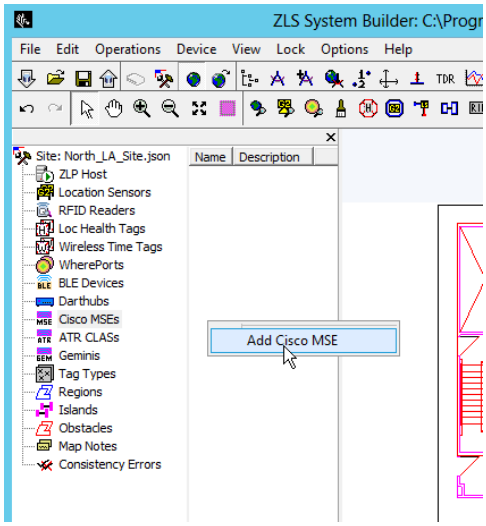
Where <MWE-MapID> is the id of the Map in MWE, and where the blinks should be posted. This MapID can be read from the MapID column in the Tags report in the MWE web client.

The CLAS service must be restarted for changes in rtls.conf to take effect. Refer to the CLAS documentation for more details on configuring the CLAS software.

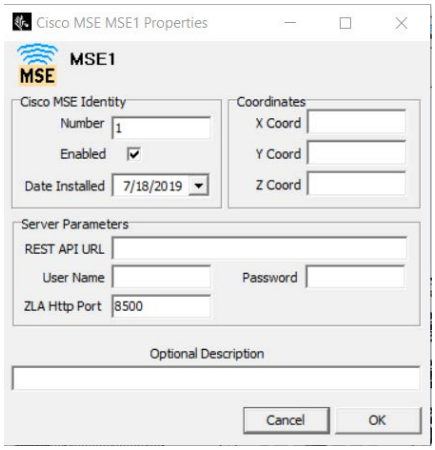
Adding Cisco MSE

MWE can consume and process locate data generated by one or more Cisco MSE's. A Cisco MSE is added to MWE by simply specifying the URL (REST API URL) and login credentials for the MSE in System Builder. The map file, map name, and map calibration used by MWE and MSE must be the same. The origin of the coordinate systems in MWE and MSE, however, can be different. MWE will automatically convert the x,y coordinates received from the MSE system to the MWE coordinate system.

1. To add a Cisco MSE device in System Builder, click on the **`Cisco MSE`** item in the tree-view, then right-click on the middle pane and select **`Add Cisco MSE`** from the popup menu:



The **`Cisco MSE Properties`** window opens:

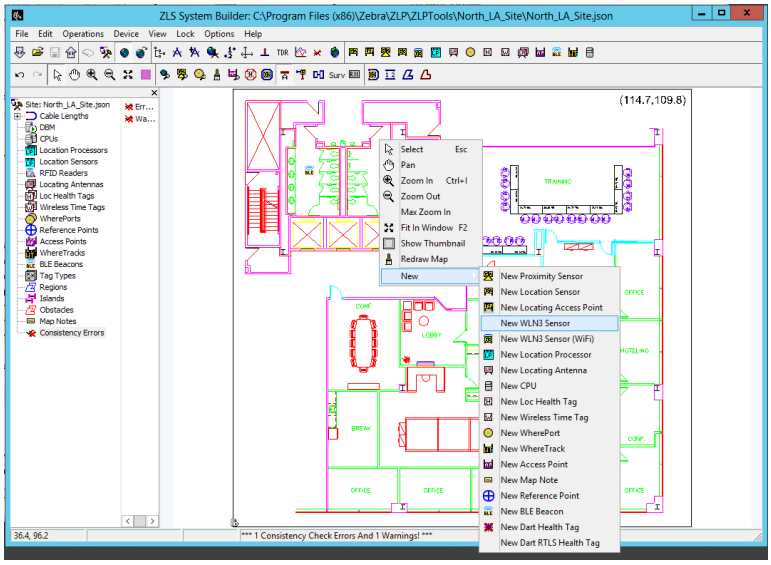


2. Provide the API URL and login credentials for the Cisco MSE.

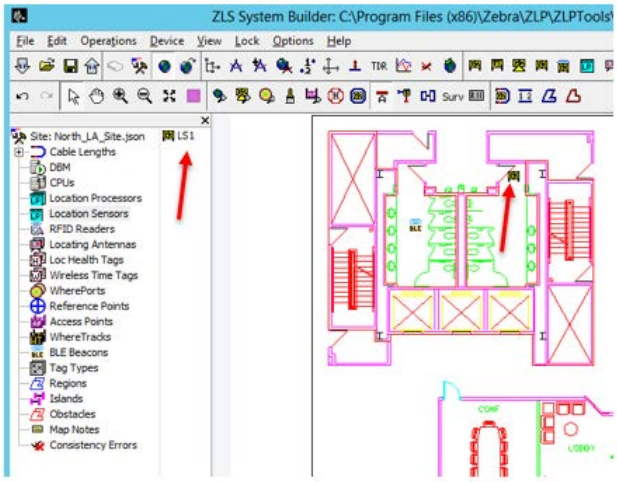
Adding WhereLan III Sensors

This section describes how to add a couple of WhereLan III sensors (also known as WLN3 or G3 sensors), which detect and process transmissions from WhereTags (a particular type of RFID tag from Zebra Technologies).

1. To add a G3 sensor, you can right-click on the spot on the map where you want to place the G3 sensor, and select **`New > New WLN3 Sensor`** from the popup menu.



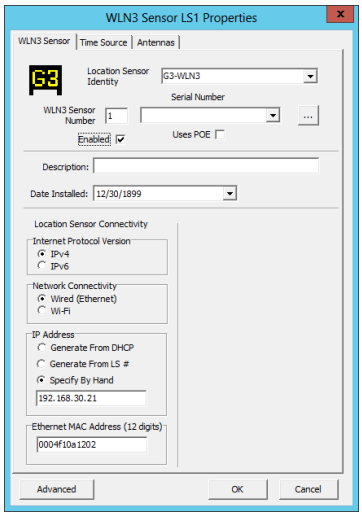
A WLN3 Sensor icon will be shown on the map where you right-clicked, and **`LS1`** (for Location Sensor #1) will be shown in the lists of Location Sensors in the middle pane.



2. Drag the sensor icon to the desired location on the map.

3. Double-click on the **WLN3 Sensor** icon on the map or on **LS1** in the middle pane.

   The **Sensor Properties** window will open.

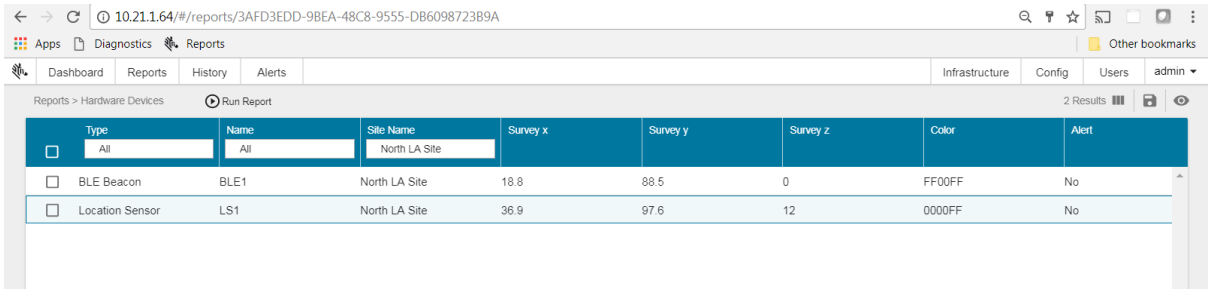


4. Type in the sensor IP address (or otherwise select DHCP) and the sensor MAC address.

   The x,y values can be manually adjusted in the Antennas tab. More details on the parameters found in the Antennas and Time Source tabs are beyond the scope of this document and can be found in the System Builder User Manual.

5. Click **OK**.

You can add as many additional sensors on each map as necessary. When publishing, all devices that you have added are shown in the **Config > Hardware Devices** page in the web client.



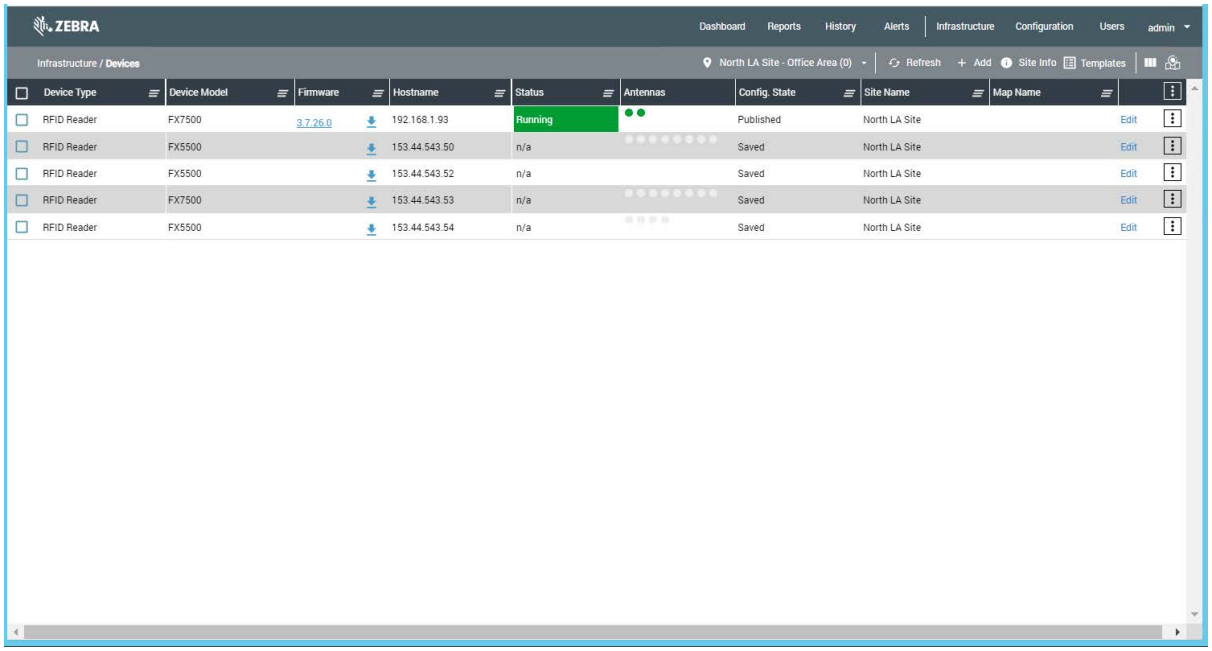
Specifying Location Algorithms

When adding WhereLAN sensors or DVR sensors in System Builder, one or more location algorithms must be specified. Supported location algorithms include trilateration, bilateration, presence, broadway, and maximum likelihood. Once one or more Location Sensors have been added on a map in System Builder, one must define locate regions and specify the location algorithms to be used in each region.

Device Manager

System Builder is used to generate a site configuration file (site.json) that is consumed by a ZLA. This file includes configuration and operational parameters for the location sensors installed at a site. A ZLA sends configuration information to these sensors and receives tag location data from them.

MWE 2.0 supports an alternative method for adding locating devices to the MWE system in a simpler way, directly from the `Devices` report in the MWE web client. This report is also referred to as **`Device Manager.`** The picture below shows the **`Devices`** report in the MWE web client.

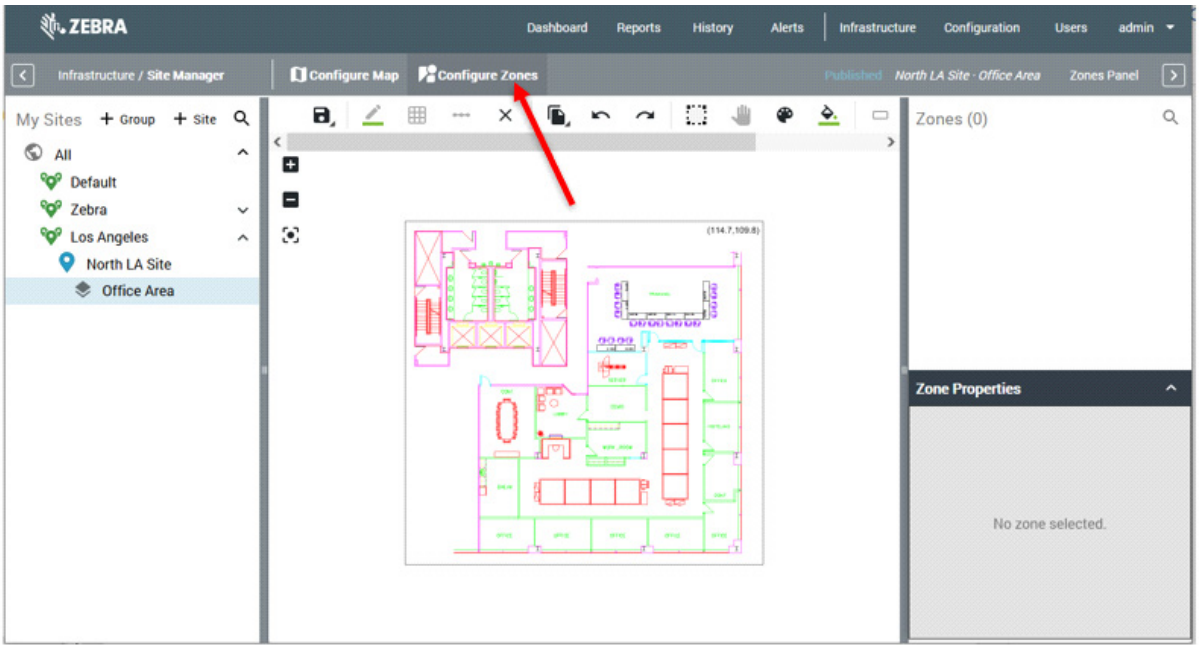


On this page you can add, configure, and manage devices. Only passive RFID readers (FX7500, FX9600) can be added in this page in MWE 2.0. The readers must have firmware version 3.9.16 or higher and must have the R2C (Read to Cloud) application installed. Support for other device types will be added in future MWE releases.

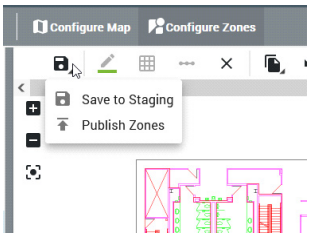
For a detailed description of the functionality available in Device Manager, refer to the Device Manager User Guide.

Defining Zones

When tracking and locating an asset, we typically want to know not only the x,y coordinates, but also the name of zones or locations where that asset is and has been. In MWE 2.0, zones are defined in the **`Infrastructure > Site Manager`** page. Click on a map in the tree-view and then click on the **`Configure Zones`** tab in the map window. Note that the map must be calibrated before you can define zones.



Hover over each tool on the toolbar to display a tooltip indicating the tool function. The tools are intuitive to use and can be learned quickly by simply trying them. The **`Publish/Save Zones`** tool-button offers two options: **`Save to Staging`** saves zones without publishing to MWE in case you want to continue to work on the zones later, while **`Publish Zones`** publishes the zones and that become visible and active in MWE.



Configuring Authentication Modes

MWE supports the following authentication modes for accounts logging into the MWE web client and MWE configuration tools.

Database	In this mode, login accounts are created and authenticated locally in the MWE database. The default admin account created by the installation scripts is a local database account.
LDAP	When this mode is selected, login accounts are authenticated against a LDAP server on the network. Active Directory authentication is supported under this authentication mode. When the LDAP mode is selected, it is still possible to specify an exception list of local database accounts that are authenticated against the local MWE database.
ADFS	In this mode, login accounts are authenticated against an ADFS server on the network. This mode does not allow login by any local database accounts.
Database, ADFS	This mode allows accounts authenticated against an ADFS server and local MWE database accounts.
OIDC	In this mode, login accounts are authenticated against an OIDC server on the network. This mode does not allow login by any local database accounts.
Database, OIDC	This mode allows accounts authenticated against an OIDC server and local MWE database accounts.

When installing MWE, select one of these authentication modes. Normally one chooses Database at installation time, as the other options require entering several configuration parameters that may not be available at installation time.

At any time after installation, one can select and configure any of the authentication modes listed above. This is done by updating the **`/root/mwe/.env`** configuration file on the MWE Linux server, as explained in the following sub-sections.

Database

- Edit the .env file and set:

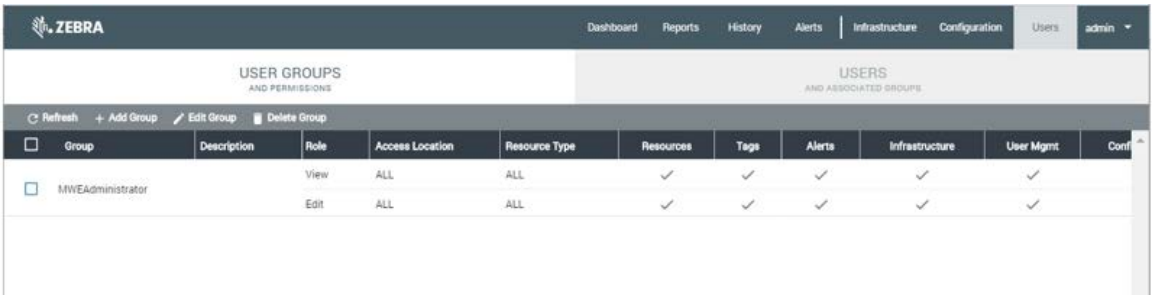
  `AUTH_TYPE=database`

- Save the file and run these commands to apply the change:

  ```
  #  cd /root/mwe
  #  docker-compose up -d authsvc
  ```

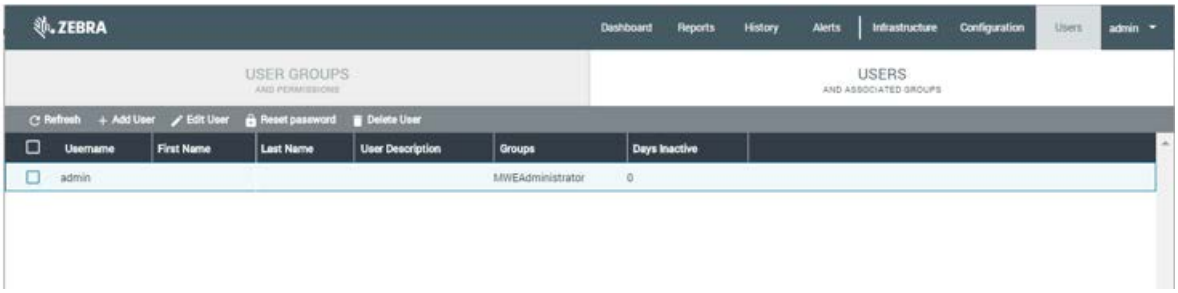
- The final step is to use the `Users` menu item in the MWE web client to create users (login accounts), user groups, and specify permissions for each user group, as explained below.

To create local user accounts and user groups, log into the MWE web client using the MWE admin account and click on **Users** on the menu bar. This tab includes two sub-tabs or pages, namely, **USER GROUPS** and **USERS**.



The **USER GROUPS** page is the place where to add user groups and specify the permissions for each group. These groups will exist only on the local MWE database.

The **USERS** page is where one can create local user accounts (stored in the MWE database) and assign them to user groups. Domain login accounts do not need to be added here.



LDAP

- Edit the .env file and set:

  `AUTH_TYPE=ldap`

Provide valid values for the LDAP parameters in the **`.env`** file. Default values in **`.env`** are provided only as examples and are shown below:

```
LDAP_URL=ldap://192.168.30.52
LDAP_USER_BASE_DN=CN=Users,DC=CLUSTER,DC=ZEBRA,DC=COM
LDAP_SEARCH_BASE_DN=CN=Users,DC=CLUSTER,DC=ZEBRA,DC=COM
LDAP_EXCLUDE_USERS=admin,user1,user2
LDAP_DEFAULT_USERGROUP=defaultLdapUserGroup
LDAP_AD_DOMAIN=CLUSTER
LDAP_VENDOR=ActiveDirectory
LDAP_SVC_ACCOUNT_NAME=uid=Ldap.Svc,ou=People,dc=cluster,dc=wherenet,dc=com
LDAP_SVC_ACCOUNT_PASSWORD=password
```

Here is a brief explanation of some of the parameters:

LDAP_URL LDAP_USER_BASE_DN LDAP_SEARCH_BASE_DN LDAP_AD_DOMAIN	These four parameters should be provided by the customer's IT department.
LDAP_VENDOR	This parameter can be set to ActiveDirectory or OpenLdap, depending on the LDAP version being used.
LDAP_EXCLUDE_USERS	This is a comma separated list of local MWE local login accounts (that is, accounts defined using the MWE web client and stored in the MWE database) that are allowed to login when LDAP is enabled.
LDAP_DEFAULT_USERGROUP	If MWE cannot obtain from the LDAP server the user group for a particular user, or if the obtained user group cannot be matched to an existing MWE user group, then MWE will assign this user to the MWE user group specified in **LDAP_DEFAULT_USERGROUP**. The default setting is **LDAP_DEFAULT_USERGROUP=defaultLdapUserGroup**. The user will therefore have the MWE permissions or access level associated with this default user group.
LDAP_SVC_ACCOUNT_NAME LDAP_SVC_ACCOUNT_PASSWORD	These two parameters are needed only for OpenLDAP, which requires a service account to grant access for directory search of a user's DN (Distinguished Name). In OpenLDAP, DN is required for the user login.

NOTE: You will see the parameter LDAP_SVC_ACCOUNT_PASSWORD in the .env configuration file only before running the MWE installation or upgrade scripts. These scripts will remove all passwords from the .env file and encrypt them into the vault service. Therefore, you can only enter the password in .env before performing an MWE installation or upgrade. To change the password after installation, please run these commands on the Linux server:

```
# cd /root/mwe
# ./mwe --update-openldap-password
```

You will be prompted to enter the password for **LDAP_SVC_ACCOUNT_PASSWORD**.

After providing valid values for the LDAP parameters in **.env**, save the file and run these commands to apply the changes:

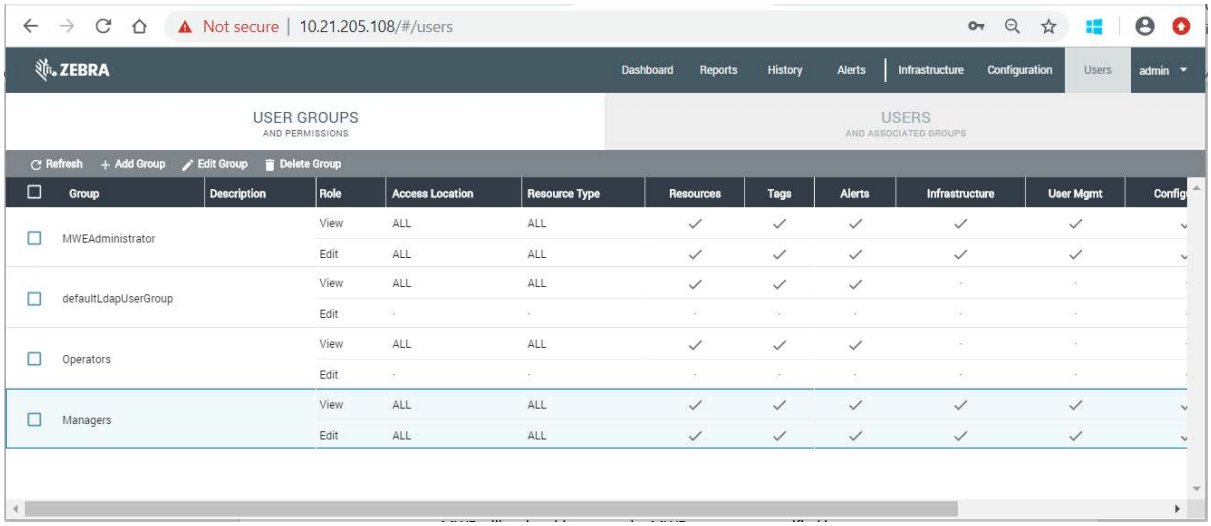
```
#  cd /root/mwe
#  docker-compose up -d authsvc
```

The final step is to create MWE user groups that match the names of user groups on the LDAP server. For example, if the domain user accounts that will log into the web client belong to the LDAP user groups Managers and Operators, then you should create the user groups Managers and Operators in MWE.

1. Log into the MWE web client using the MWE admin account.
2. Click on **Users** on the menu bar, and select the **USER GROUPS** tab.

3. Add the groups and specify the permissions granted to each group, as shown in the figure below.

   Don't forget to also add the group **defaultLdapUserGroup** mentioned above.



ADFS

1. Edit the **.env** file and set:

   ```
   AUTH_TYPE=adfs
   ```

2. Provide valid values for the ADFS parameters in the .env file. Default values in .env are provided only as examples and are shown below:

   ```
   ADFS_CLIENT_ID=fce8beb4-3974-4d02-a3d4-a7233343fcd8
   ADFS_CLIENT_SECRET=eb4QD9L5xwJOYWB9Y4-iBTIi4YqkqBNOixVx_xm5
   ADFS_DISCOVERY=https://WIN-C3V92OI2O7J.example.com/adfs/.well-known/openid-configuration/
   ADFS_RELYING_PARTY_TRUST_ID=mwe-adfs
   ADFS_PARSER=IsMemberOf
   ADFS_IDENTITY_KEY=mail
   ADFS_GROUP_KEY=memberof
   ```

   The values for these parameters should be provided by the customer's IT Department.

   It should be noted that possible values for ADFS_PARSER are:

   ```
   IsMemberOf (e.g. [CN=MWE,...)
   groupsOnly (e.g. [MWE, ...])
   tokenGroup (e.g. [zebra\MWE, zebra.lan\MWE, ...])
   ```

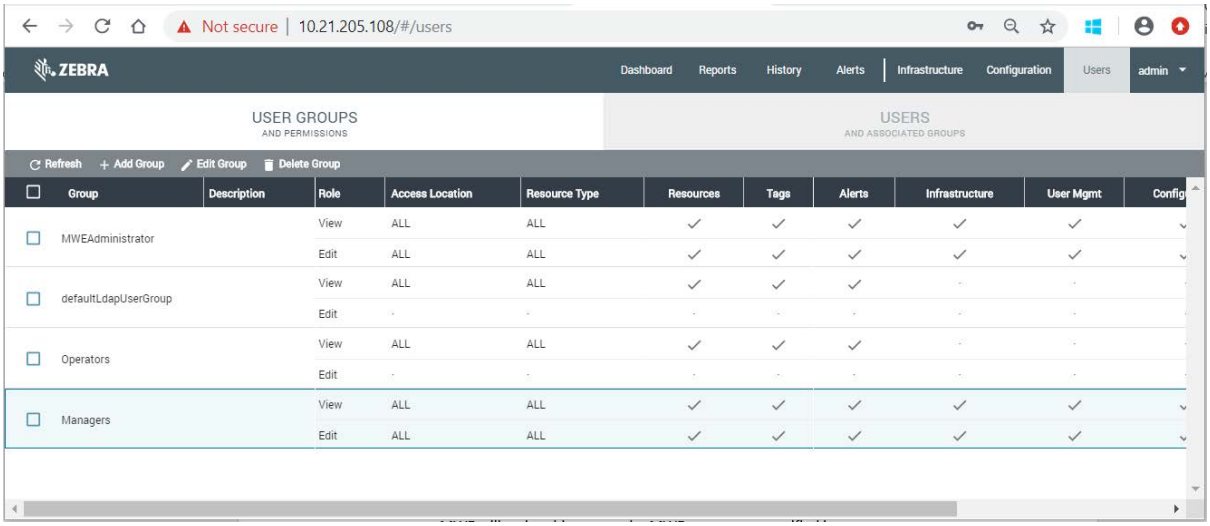
3. After providing valid values for the ADFS parameters in .env, save the file and run these commands to apply the changes:

   ```
   #  cd /root/mwe
   #  docker-compose up -d authsvc
   ```

The final step is to create MWE user groups that match the names of user groups on the ADFS server. For example, if the domain user accounts that will log into the web client belong to the ADFS user groups Managers and Operators, then you should create the user groups Managers and Operators in MWE.

1. Log into the MWE web client using the MWE admin account.

2. Click on **Users** on the menu bar, and select the **USER GROUPS** tab.
3. Add the groups and specify the permissions granted to each group, as shown in the figure below.



Database, ADFS

1. Edit the .env file and set:

   ```
   AUTH_TYPE=database,adfs
   ```

2. Configure the ADFS parameters as explained in the previous section.
3. In the MWE web client, add as many local user accounts as desired (see section Database above).
4. After updating .env, save the file and run these commands to apply the changes:

   ```
   #  cd /root/mwe
   #  docker-compose up -d authsvc
   ```

5. When launching the MWE web client, you will see both the normal login screen for database accounts and an ADFS Login button for ADFS account login.

Installing a SSL Certificate

Here are the steps to install a SSL certificate on the MWE server:

- Putty into the MWE server
- Create a **custom** directory:

  `# mkdir /data/mwe/images/certs/custom`

- Using Putty or WinSCP, copy the certificate files (pem) to this location: `/data/mwe/images/certs/custom/`

The certificates names must be server.pem, server.key and cacert.pem

- In Putty, switch to mwe user and mwe directory:

  `# su – mwe (if prompted for a password, it is 'Zebra123')`

  `# cd /data/mwe`

- Run this command:

  `# ./mwe --configure-secure-connection`

```
[mwe@z21st-cent08 mwe]$ ./mwe --configure-secure-connection
-----------------------------------------
MWE secure configuration:
-----------------------------------------
Configure secure communication to MWE and between MWE/RFID Readers.
Do you want use secure connection to MWE Server (y/n): y     ----> Answer y
Is DHCP used in Zebra RFID Readers (y/n): n                  ----> Answer y or n
In order to communication securely, MWE needs valid certificates.
The certificate can be provided in the following way:
Select certificate option:
0. Configure later by running ./mwe --configure-secure-connection (use default unsecure
settings for now).
1. The customer provides certificates based on your fully qualified domain name (FQDN)
(preferred).
2. MWE generates certificates based on your fully qualified domain name (FQDN)
3. MWE generates default certificate (based on zebramwe)
4. Cancel and keep current settings
Choose an option: 1                                          -----> Select option 1
```

Camel Interface and REST API

MWE provides the Apache Camel interface and a REST API for third party applications to integrate to MWE.

Camel is a flexible and powerful interface that allows data exchange between different systems, and provides routing and mediation rules in a variety of domain-specific languages, including Java, Scala, and XML.

Details on the MWE Camel interface and on the MWE REST API are provided in separate documentation. Request the latest version of these documents from Zebra Product Support.

Configuring Email Notifications

MWE supports sending email notifications when a system alert or a resource alert is generated by MWE. System alerts are about the health and status of the MWE system, including tags, sensors, readers, and the MWE server itself; these alerts are predefined in MWE. Resource alerts are defined by a user using the Business Rules Engine provided in MWE and are based on the location and status of tags and resources.

In MWE 2.0, the information about the email server to be used for alert emails is manually entered in a configuration file on the MWE server. In a future MWE release this information will be entered via the MWE web client. The two sub-sections below explain how to enter the email server information for business rules alerts and for system alerts.

Resource Alerts

The Business Rules Engine in MWE sends email notifications to the email server specified in the `/etc/zebra/mwe/conf/camel/general.properties` file on the MWE server. Refer to the MWE 2.0 User Guide for details on the Business Rules Engine.

The content of the `general.properties` file is:

```
email.username=senderemail_username
email.password=senderemailpassword
email.server=smtp.example.com
email.protocol=smtp
email.port=25
email.from=senderusername@exampleServer.com
```

Each parameter in the file has default sample values explained below.

`email.username` and `email.password`	If the email server requires an authentication account to accept messages from the MWE server, provide the account credentials here.
`email.server`	Name or IP address of the email server.
`email.protocol`	It can be smpt or smpts.
`email.port`	This is the port on the email server where to send email messages. You should check with the customer's IT department.
`email.from`	Enter here the email address that you would like to be shown as Sender in the email messages generated by the Business Rules Engine

For the changes in general.properties to take effect, please run the following command on a Teminal or Putty connected to the MWE server:

```
# docker restart mwe_camel_1
```

Device Alerts

The System Alert Settings report in the MWE web client lists the device alerts available in MWE. They include alerts related to the health and status of tags, sensors, and readers that are part of the location infrastructure. Information about the email server to be used for these device alert is entered in the **/data/mwe/.env** file on the MWE server.

The configuration parameters are:

al_email_host	This is the name or IP address of the email server
al_email_name and al_email_address	The name and email address that should be shown in the Sender field of email messages
al_email_SMTP_useSASL	Enter N (default) if the email server does not require an authentication account to accept messages from the MWE server. Enter 'Y' if it does require it; in this case, the login credentials need to be entered using the WT Alerts tool (see below).

For changes to any of the parameters discussed above under the **System Alerts** section to take effect, it is necessary to restart the Alert Notification Service on the MWE Windows server. You can do this from Windows Services or from the MWE WT Services tool.

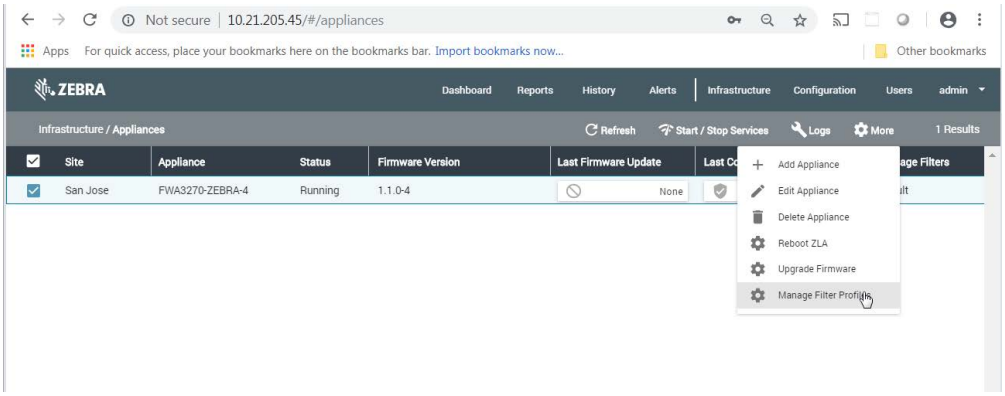
```
# su - mwe
# cd /data/mwe
# docker stop mwe_monitor_alertmanager
# docker-compose stop alertsvc
# docker start mwe_monitor_alertmanager
# docker-compose up -d  alertsvc
```

ZLA Median and Rate Filters

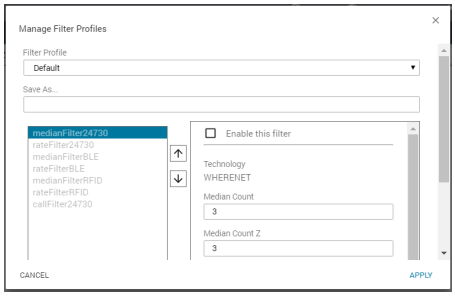
The ZLA is the device or module within MWE that receives all data from a variety of locating devices and then forwards it to the MWE. Often the data is redundant, and it is desirable to filter it to decrease network traffic or system load.

MWE provides median, time rate, and distance rate filters that can be defined separately for WhereNet tags, passive RFID tags, and BLE blinks (from Coffey tags). A filter defined at the ZLA level is applied to all tags of a type (WhereNet, RFID, BLE). The MWE User Guide explains how to apply similar filters to a particular resource type defined by a user.

1. To define and apply a ZLA filter, launch the MWE web client and open the **`Infrastructure > Appliances`** report.
2. Select the desired ZLA, and select **`More > Manage Filters`** from the menu bar.



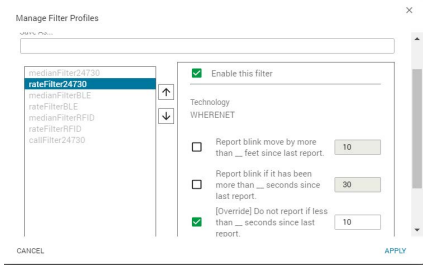
The dialog window opens:



For example, if you would like to define a rate filter for WhereNet (24730) tags and passive RFID tags such that at most one blink is allowed through every 10 seconds per tag ID.

1. To define such a filter:
   a. Click on **`rateFilter24730.`**
   b. Check the **`Enable this filter`** checkbox.
   c. Check the **`Do not report if less than … seconds since last report`** checkbox.

d. Enter **10** in the corresponding input box.



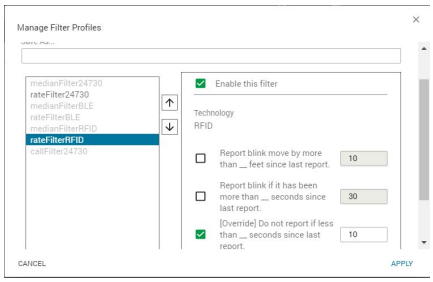
2. Then:

   a. Click on **rateFilter24730.**

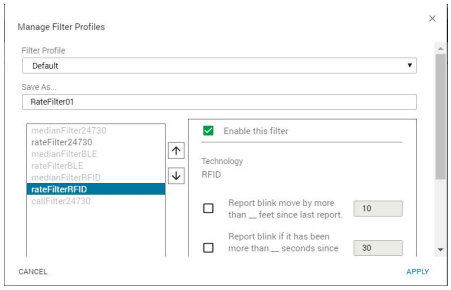
   b. Check the **Enable this filter checkbox.**

   c. Check the **Do not report if less than … seconds since last report** checkbox.

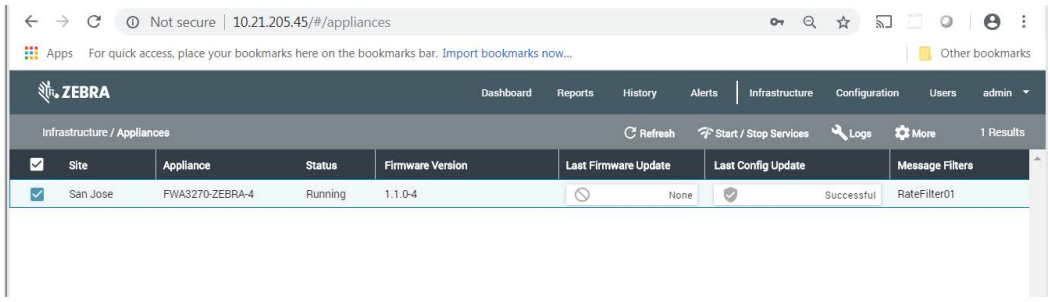
   d. Enter **10** in the corresponding input box.



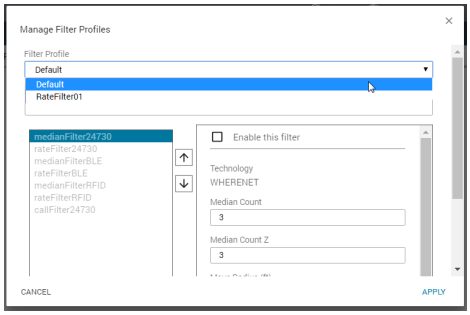
3. In the **Save As… input** box, enter a filter name of your choosing; for example, **RateFilter01**, and click the **Apply** button.



After a few seconds, the `Message Filters` column in the `Appliances` report shows the filter being applied:



4. To remove the filter, select the **`Default`** filter (assuming it still has its default configuration with no filters enabled), or create and apply a filter (named, for example, NoFilter) that has no filters enabled.



Currently, in addition to the Default filter, only one additional filter can be saved for future use.

For a description of how the time rate filter, distance rate filter, and median filter work, refer to the MWE User Guide section on Resource Type Filters, where the same filters are described but are applied to resource types defined by a user.

Other Configuration Tasks

The configuration tasks described in this document are performed only once or seldom after installing the software. After completing these configuration steps, the system should be fully functional. In particular, the **Reports > Tags** page in the web client should show tag blink data with x,y coordinates being displayed on the correct site map.

However, there are several additional configuration tasks that further customize the application or that are performed on a frequent basis. These tasks include defining resource types, associating tags with resources, defining data filters, configuring the various reports (columns displayed and column order), and more. This configuration tasks are described in the MWE User Guide, which also describes the basic functionality of the web client for end users.

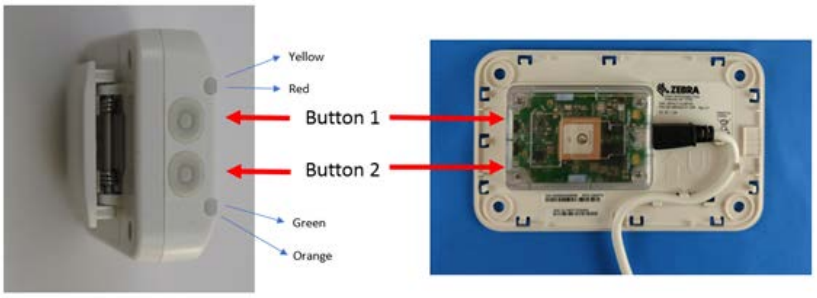
Reference Documents

- MWE 2.0 Installation Guide
- MWE 2.0 User Guide
- MWE Camel Interface
- MWE REST API
- CLAS Server and Software Installation Guide

Appendix: BLE Receiver Configuration

This appendix discusses the initialization of MPACT BLE receivers. An MPACT BLE receiver is initialized (or bootstrapped) by downloading a bootstrap configuration file named badge_config.json. as explained below.

When powered up, a receiver checks its internal flash to check whether it has been initialized. If the initialization has previously been done, it uses that configuration in flash for its operations. A receiver can also be re-initialized at any time by pressing button 2 on the receiver for 30 to 40 seconds.



MB6000 MB5000

If the receiver has not been configured previously, or it has been reset, it will act as a WIFI client and attempt to join a WiFi network with the following parameters:

SSID	mpact_init
Security Type	wpa2
Security Key	mpact123

Once the receiver has joined the WIFI network successfully, it will try to connect to a web server running at the following specific IP address and port:

HTTP Server IP Address	192.168.1.100
HTTP Server Port	8005

The receiver performs a HTTP GET operation to download the bootstrap configuration file **`badge_config.json`**.

Therefore, for a receiver to obtain its bootstrap configuration file **`badge_config.json`**::

1. Setup a WiFi access point on a 192.168.1.x network with the parameters given above.
2. Add to this network a computer with IP 192.168.1.100 running an http server (such as a Windows machine running MS web server), and open port 8005 on this computer.

3. Place the file badge_config.json at the root of the web server. Configure the web server to serve the file via port 8005.

A sample **badge_config.json** is given below:

```
{
   "wifiProfiles": [{
        "ssid": "WIFI01",
        "securityKey": "1112223334",
        "securityType": "WPA2",
        "wpaEnterpriseUser": "",
        "wpaEnterprisePassword": "",
        "eapType": "",
        "enable": true
     }
   ],
   "gatewayConfigs": [{
     "user": "superuser",
     "password": "mpact123",
     "receiverConfigURL": "http://192.168.1.83:8005/ReceiverConfig.json",
     "configPullFrequencyInMins": 15,
     "enable": true
   }]
}
```

Typically, the only values needed to change in badge_config.json are the ones highlighted in red color font in the above example.

The **wifiProfiles** section specifies the WiFi access point on the network that the receivers will connect to for retrieving receiver configuration and sending data. This is the same network hosting the ZLA.

The **gatewayConfigs** section specifies the IP address of the ZLA (192.168.1.83 in the example above) from where the receiver will pull a configuration file named ReceiverConfig.json, which specifies where to post data and other operating parameters. This file is pulled periodically with a frequency specified by the **configPullFrequencyInMins** parameter.

A sample ReceiverConfig.json file is given below:

```
{
   "scanIntervalInMilliseconds": 500,
   "wifiTransmissionInterval": 10,
   "heartbeatIntervalInSeconds": 30,
   "timePullIntervalInMinutes": 5,
   "beaconWhiteList": [{
     "uuid": "FE913213-B311-4A42-8C16-47FAEAC938FE",
     "type": "mpact"
   }, {
     "uuid": "00001200-0000-1000-8000-00805F9B34FB",
     "type": "ibeacon"
   }, {
     "uuid": "FE913213-B311-4A42-8C16-47FAEAC938DB",
     "type": "mpact"
   }],
   "profiles": [{
     "name": "Location Beacons",
```

```
      "profileLow": 0,
      "profileHigh": 999,
      "beaconType1": "Mobile",
      "proximityRanges": [{
         "name": "Near",
         "rssiLow": null,
         "rssiHigh": null,
         "beaconHitCount": 1,
         "scanRetentionInterval": 1,
         "sendClosestOnly": false,
         "suppressRepeats": true
      }]
   }, {
      "name": "Asset Beacons",
      "profileLow": 1001,
      "profileHigh": 65534,
      "beaconType1": "Fixed",
      "proximityRanges": [{
         "name": "Near",
         "rssiLow": null,
         "rssiHigh": null,
         "beaconHitCount": 1,
         "scanRetentionInterval": 1,
         "sendClosestOnly": false,
         "suppressRepeats": true
      }]
   }],
   "serviceUrls": {
      "timeService": "http://192.168.1.83:8005/ReceiverConfig/gettime",
      "eventService": "http://192.168.1.83:8005/ReceiverConfig/event/",
      "healthService": "http://192.168.1.83:8005/ReceiverConfig/health/"
   }
}
```

Typically, the only values you will need to change in **badge_config.json** are the ones highlighted in red color font in the above example.

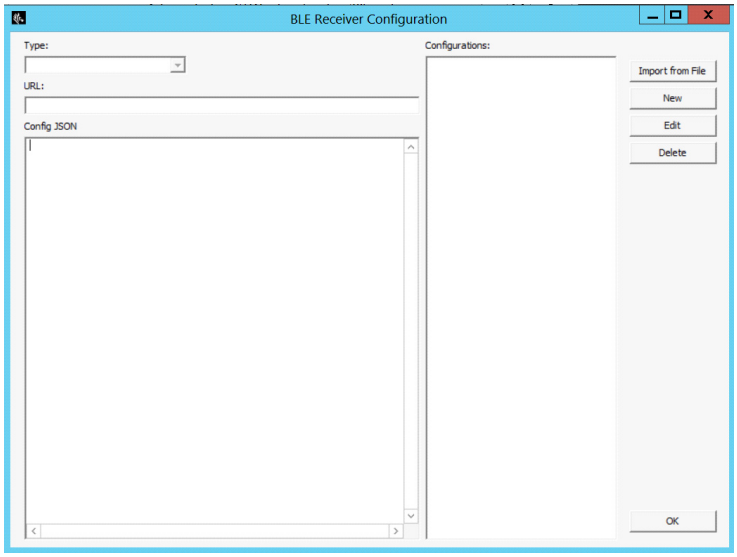
A BLE receiver will process data only from BLE beacons having a UUID listed in the **beaconWhiteList** section.

The section **profiles** allows a BLE receiver to apply different processing parameters to different BLE beacons depending on the value of the beacon's Major property, which is specified when configuring a BLE beacon. If a beacon's Major property falls between the values **profileLow** and **profileHigh** for a profile, then the BLE receiver will use that profile when processing data from the beacon.

The IP address in the **serviceUrls** section is the IP address of the ZLA and tells a BLE receiver where to get current time and where to post Beacon data (events) and receiver health and status messages. As mentioned previously, this IP address is the only parameter you typically need to modify in the ReceiverConfig.json file.

Next, load **ReceiverConfig.json** in System Builder, so that its content will be embedded in the **site.json** configuration file published by System Builder to the ZLA, allowing the ZLA to serve **ReceiverConfig.json** to BLE receivers.

The **BLE Receiver Configuration** window opens:

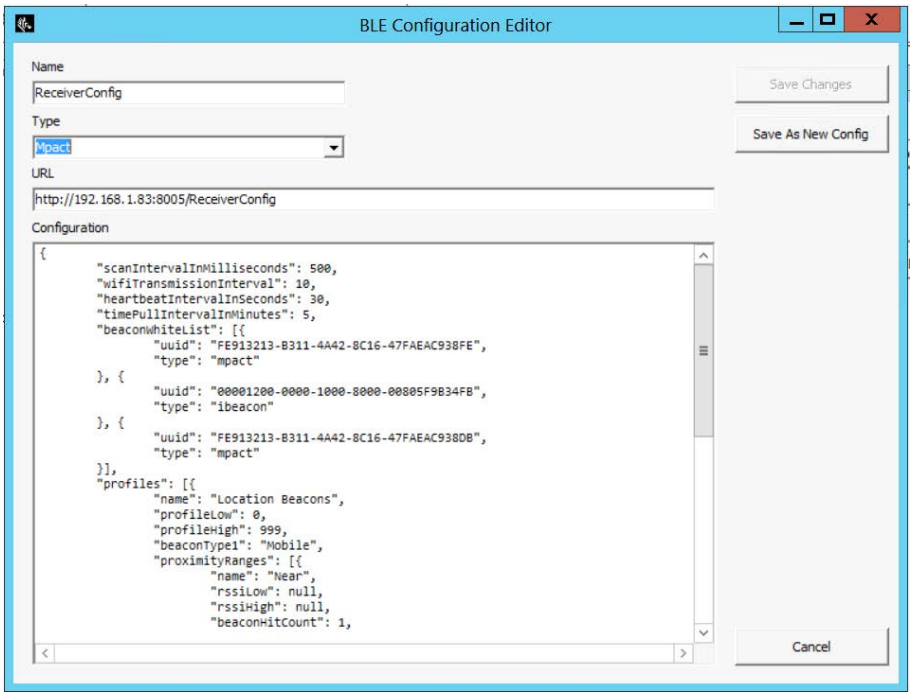


Click **`Import from File`** to load the file.

In the **`URL`** input box, copy and paste the value of the `receiverConfigURL` field from `badge_config.json`. In our example of badge_config.json given above, this value would be:

`http://192.168.1.83:8005/ReceiverConfig.json`

In the **`Config JSON`** input box, copy and paste the contents of `ReceiverConfig.json`:



In the **`Type`** dropdown list, select the type of receiver.

Click **`OK`** and save and/or publish the new site.json with System Builder.

The previous steps specify that the ZLA will server the `ReceiverConfig.json` file via port 8005 (as indicated in the URL `http://192.168.1.83:8005/ReceiverConfig.json`) and therefore TCP port 8005 must be open on the ZLA. The installation package for ZLA software version 1.1.0.5 and later will automatically open this port, but for versions 1.1.0.4 you will need to manually open this port.

To manually open TCP port 8005 on the ZLA, modify the content of the /etc/firewalld/zones/public.xml on the ZLA. Add the line highlighted in red color font below:

```
<?xml version="1.0" encoding="utf-8"?>
<zone>
  <short>Public</short>
  <service name="dhcpv6-client"/>
  <service name="ssh"/>
  <port protocol="udp" port="12282"/>
  <port protocol="udp" port="2496"/>
  <port protocol="tcp" port="12277"/>
  <port protocol="udp" port="12284"/>
  <port protocol="udp" port="12273"/>
  <port protocol="tcp" port="21"/>
  <port protocol="tcp" port="13287"/>
  <port protocol="tcp" port="12283"/>
  <port protocol="udp" port="13282"/>
  <port protocol="tcp" port="13283"/>
  <port protocol="udp" port="13286"/>
  <port protocol="tcp" port="9001"/>
  <port protocol="tcp" port="12285"/>
  <port protocol="tcp" port="9003"/>
  <port protocol="tcp" port="8005"/>
      </zone>
```

For the change to take effect, run the following command (in a Terminal or Putty window):

```
# firewall-cmd --reload
```